A WINDOW OPEN ON THE WORLD

The UNESCO Courier

JANUARY 1964 (17TH YEAR) PRICE : 50 CENTS

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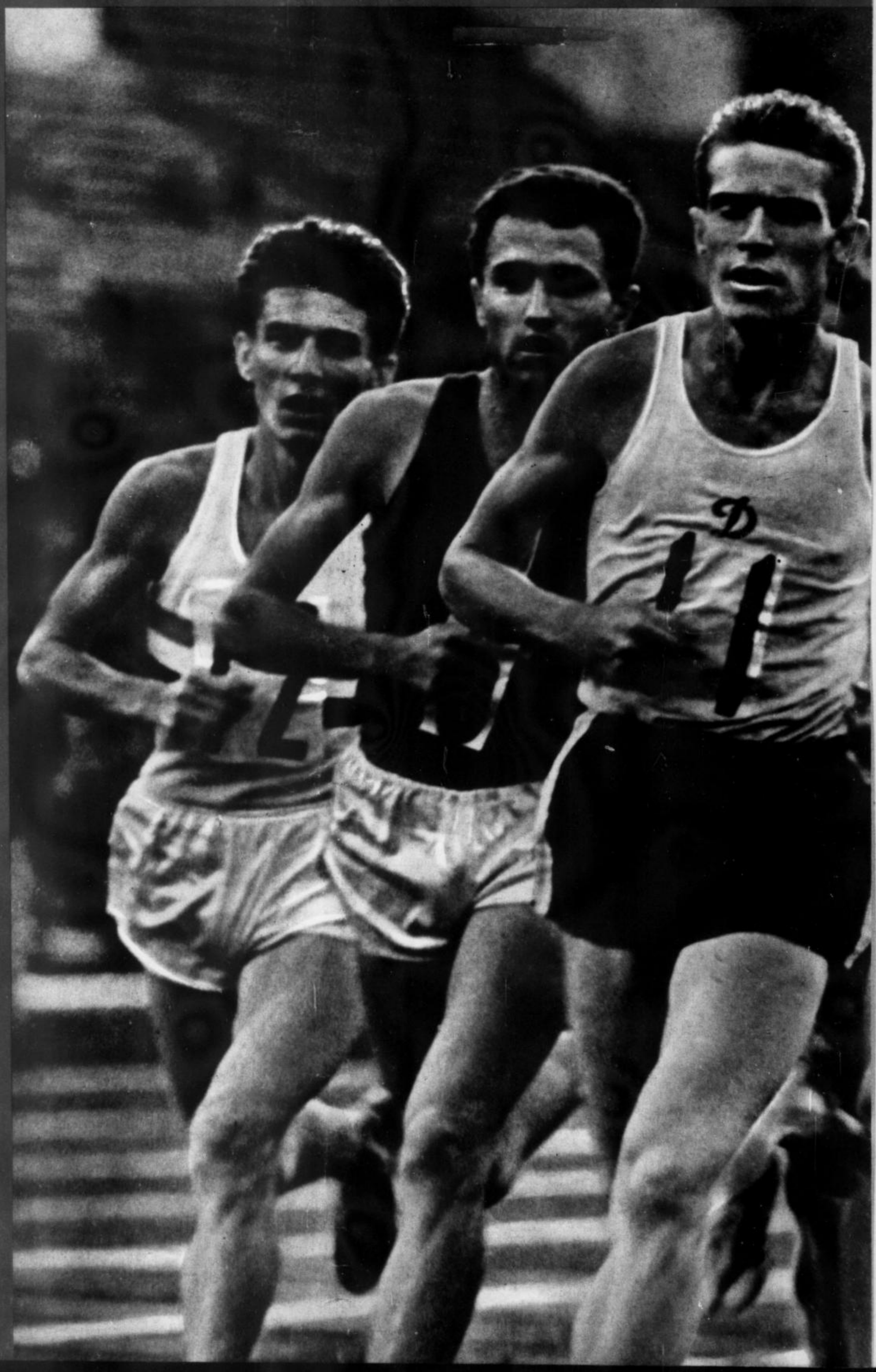
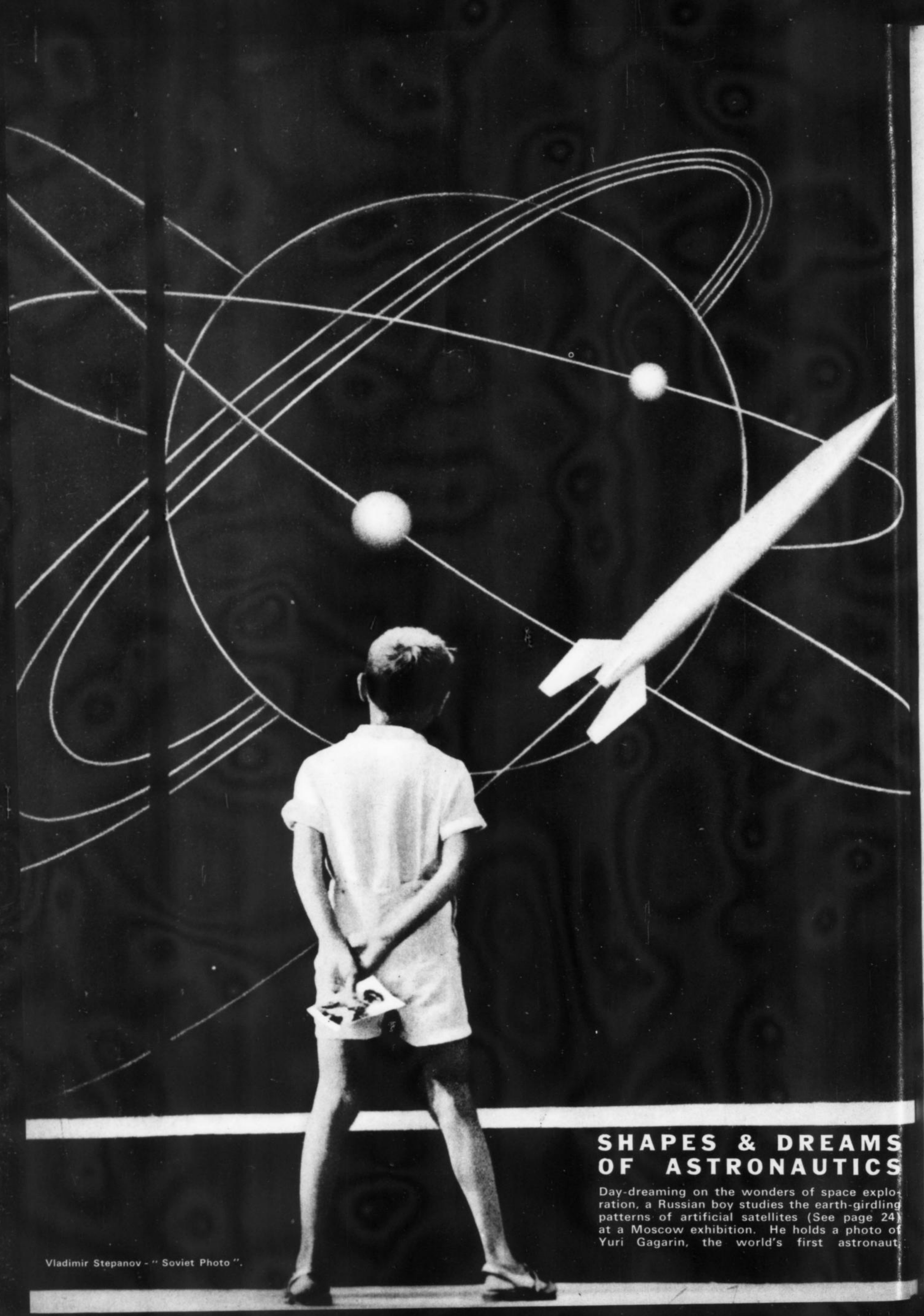


FAIR PLAY AND THE AMATEUR IN SPORT



SHAPES & DREAMS OF ASTRONAUTICS

Day-dreaming on the wonders of space exploration, a Russian boy studies the earth-girdling patterns of artificial satellites (See page 24) at a Moscow exhibition. He holds a photo of Yuri Gagarin, the world's first astronaut.

Vladimir Stepanov - " Soviet Photo ".

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17TH YEAR

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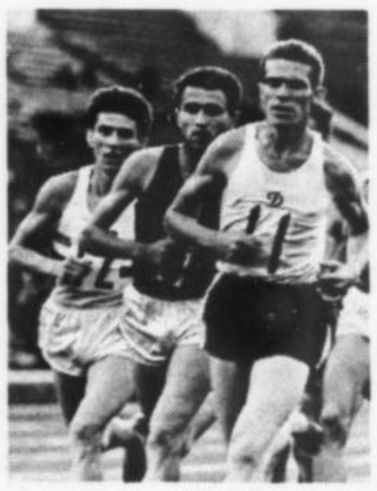

APN

COVER PHOTO

Arm and leg movements perfectly synchronized, three runners speed along a Moscow stadium track in a 5,000-metre race. Democratic and international by nature, sport has expanded enormously in the past half century. But its development has created new conditions that today call for a reappraisal of some traditional ideas and practices (see page 4).

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Sandy Koffler
Assistant Editor
René Caloz
Associate Editors
English Edition : Ronald Fenton
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SPORT IS EDUCATION

by René Maheu

We publish below extracts from an address given by M. René Maheu, Director-General of Unesco, on October 28, 1963 at the conference called in Paris by the International Council of Sport and Physical Education. M. Maheu deals with the threat to the principles of competitive sports created by chauvinism and what has been called "shamateurism". These questions were debated by the Council and also were the subject of a long report by the former French tennis champion, Jean Borotra. This international conference met on the occasion of the centennial anniversary of the birth of Baron Pierre de Coubertin (1863-1937) who was responsible for the rebirth of the Olympic Games in modern times.

For the revival of the Olympic Games we have to thank Pierre de Coubertin who, in 1892 when he was barely 30 years of age, launched the idea during the jubilee of the Union of French Athletic Clubs. Two years later the revival was officially proclaimed at the Sorbonne in Paris, and the first Olympic Games of modern times took place in Athens in 1896.

"Why did I revive the Olympic Games?" said Coubertin. "To dignify and invigorate sport, to make it independent and durable and thus better fitted for its educational role in the world today; to honour the individual athlete because of his real value to the community as a stimulus to physical exercise and to exalt feats that encourage a healthy competitive spirit."

Coubertin reiterated these ideas, though in more developed form, in "The Philosophical Bases of Modern Olympics," a message which he broadcast from Berlin in August 1935, a year before the 11th Olympic Games.

If, on this occasion, Coubertin was perhaps somewhat too ambitious in claiming that modern Olympics should be considered as first and foremost a religion, the reason was his own fervour. But the other ideas in his Olympic philosophy form a logical and compact whole of lasting value which the most lucid minds should make a point of studying.

Olympics, said Coubertin, postulate the existence and assembly of an élite of athletes, an élite whose ranks are open to anyone able to meet a single condition—superiority in sport. The process of selecting this élite itself implies a broad "democratization" of sport, and, conversely, the accomplishments of the élite help to popularize sport among the mass of the people.

Indeed, in a now familiar axiom, Pierre de Coubertin declared: "If 100 people are to take up physical culture, 50 must already be engaged in sport; if 50 are to practise sport there must be 20 who specialize; if 20 are to specialize there must be five capable of superlative feats."

Coubertin affirms too that we have nothing to fear from these "superlative feats," but that, on the contrary, "it would be utopian to try to saddle athletics with a code of compulsory moderation." Athletes must have absolute freedom to overstep all bounds. That is why they were given the vigorous motto, *citius, altius, fortius*—ever faster, higher and stronger, "the motto of those bold enough to challenge existing records," in other words to thrust back the bounds of the hitherto unattainable.

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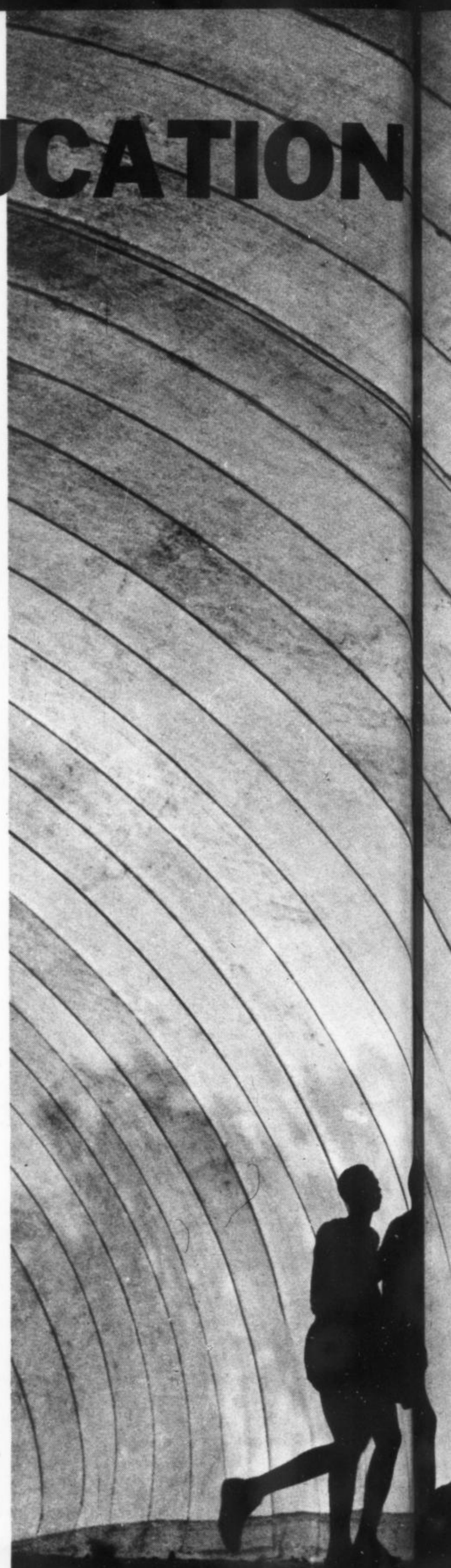

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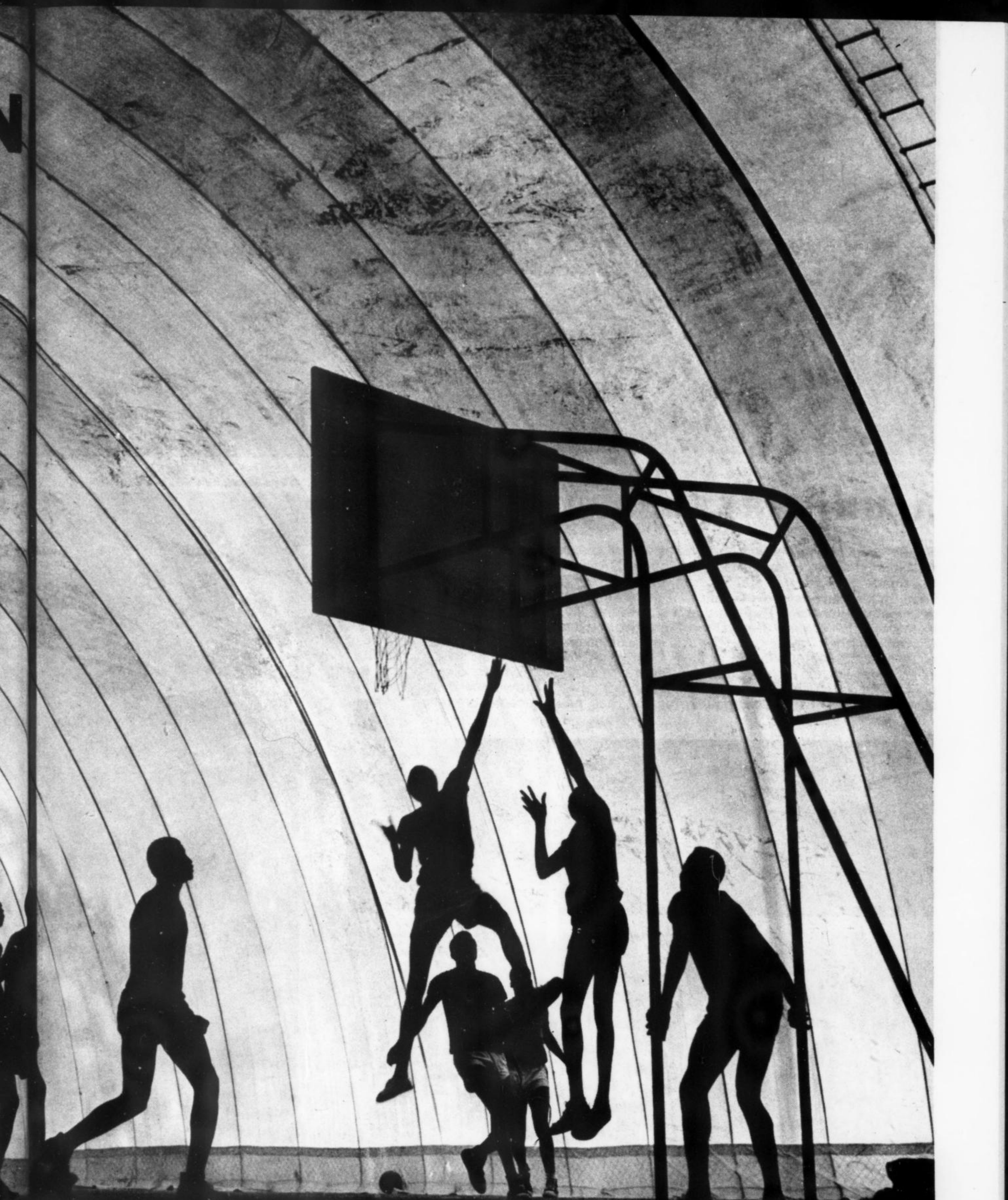

A UNIVERSAL SPORT

Sports events have become the great popular spectacles of our time and of these the most universally appreciated is football. An ancient game, it was played by the Spartans as early as 500 B.C. In medieval Italy, teams of as many as 27 a side lined up for matches between cities. A somewhat brawl-like kind of football became so popular in medieval England that it was eventually banned by law, partly because it diverted the yeomen from archery practice. It was only restored to legality by Charles II in the 17th century. The skill and excitement of football and the enthusiasm of its spectators are reflected in these photos. Above, Pelé, the "star" of the Brazilian team scores a goal. Below, Brazil's goalkeeper, Gylmar, dives across the goalmouth (the ball rebounded from the post). Right, crowd scene in an African stadium shows just how popular football has now become on this continent.

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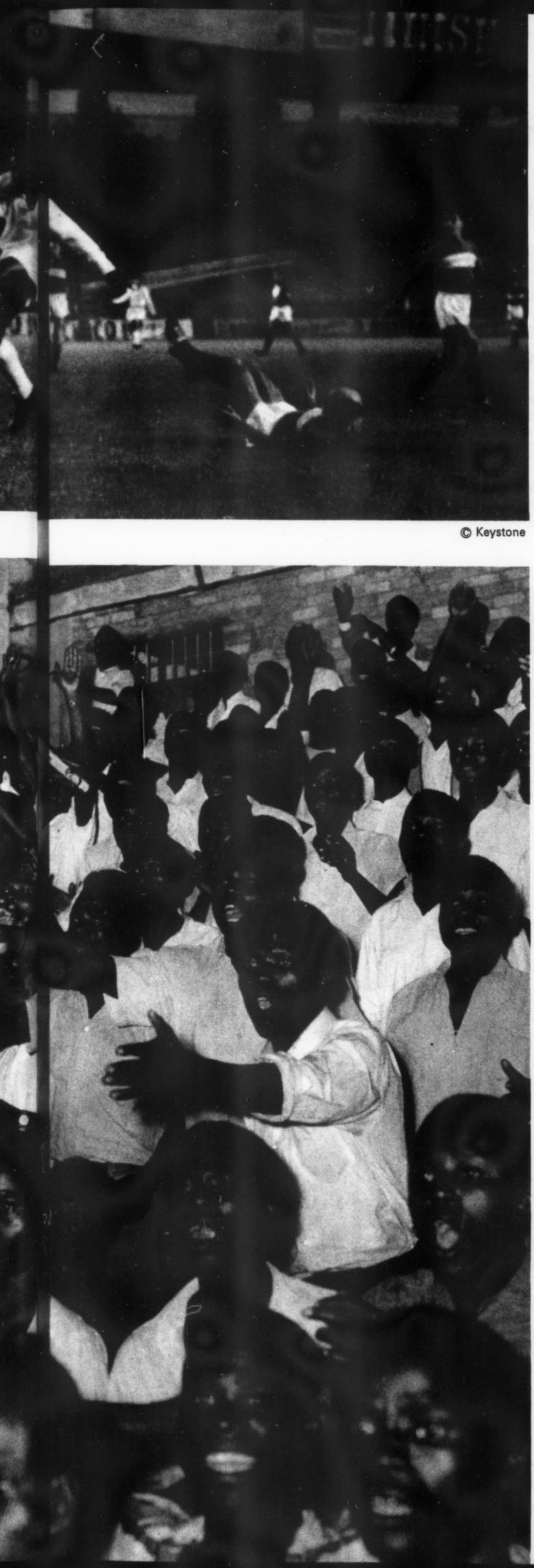

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Need for a careful reappraisal

The moral conduct of athletes must be equal to the standard of their performance in the field. Pierre de Coubertin asks them to constitute an "order of chivalry" which scrupulously observes a code of honour based on fair play. He counts on the Olympic Games to bring this home so strongly that not only will the example be followed at all sports meetings—international, national and local—but the spectators too will feel its impact.

For Coubertin the idea of a "truce" was also an important aspect of the Olympics. He saw it as a modern evocation of the "sacred truce" of antiquity, established by Iphitos, King of Elis, in agreement with Lycurgus, which for nearly 12 centuries was respected at Olympia, so that all quarrels, misunderstandings, factions and hatreds cease during the Games. The alliance of enthusiasm with the spirit of fair play found in competitive sports opens, in natural consequence, the way to mutual respect and understanding and to friendship itself. "Hatred and violence," said Coubertin, "are attributes of the faint-hearted.".

Sport *is* indeed an order of chivalry, combining honour and a code of ethics and aesthetics, recruiting its members from all classes and all peoples, mingling them in concord and friendship throughout the length and breadth of the entire world.

Sport *is* also a truce. In our technological way of life, ruled by an inexorable law of toil, in which we are only what we have, and have only what we earn, sport is the hallowed pastime, a princely gift to enrich our hours of leisure. In an era of antagonisms and conflicts, dominated by the drive for power and by pride, it is the respite of the gods in which fair competition ends in respect and friendship.

Sport, too, *is* education, the most concrete and the truest kind of education—that of character. Sport is knowledge because it is only by patient study and self-revelation that a sportsman can go from strength to strength.

Sport *is* culture because the transient movements it traces in time and space—for nothing but the sheer pleasure of doing so, as Plato has it—illuminate with dramatic meaning the essential and therefore the deepest and widest values of different peoples and of the human race itself; it is culture, too, because it creates beauty, and above all for those who usually have the least opportunity to feast upon it.

If there is one unchanging factor in Coubertin's humanistic concept of sport, from the Paris proclamation in 1894,—his profession of faith—right down to the Berlin message of 1935—his testament—it is undeniably the dual belief that sport is democratic and international by nature and vocation. Half a century of extraordinary development in sport has shown how right he was on both these points: his words have come true and his spirit has triumphed.

But is it a betrayal of his memory to point out that this confirmation and triumph have come about in conditions which call for a careful reappraisal, and even a bold revision of certain ideas or practices that he originated? I personally do not think so; I feel that he, with his remarkable open-mindedness, would be the first to undertake the necessary reappraisals.

On the first point—the democratization of sport—does anyone nowadays not see and realize that this democratization, the conditions of urban life and, of course, the raising of the level of athletic performance, have profoundly altered the conditions in which the athletic élite is selected?

The famous axiom remains true: sport needs its cham-

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'The champion is no longer an amateur'

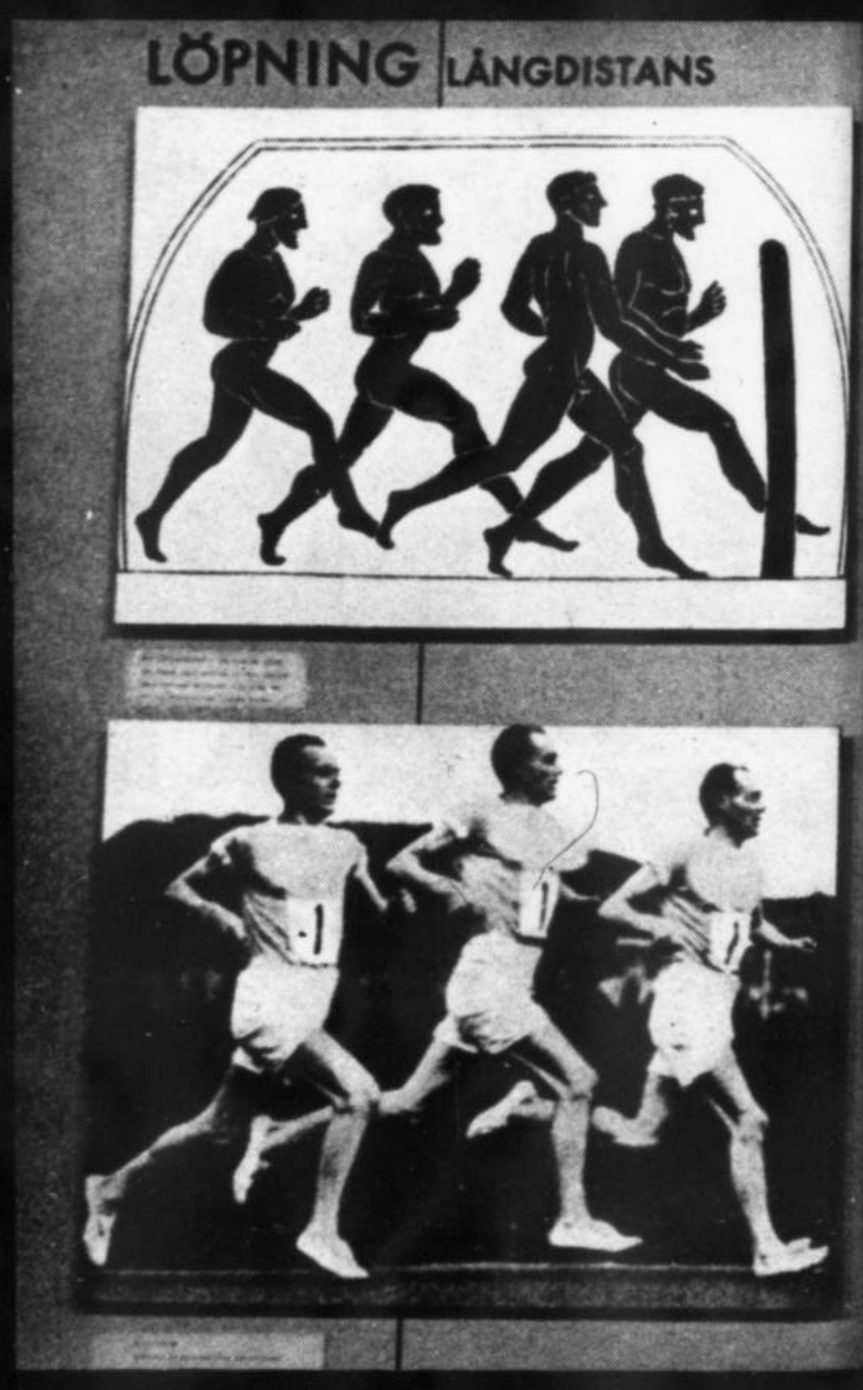
pions. But, unless the circumstances are exceptional, it is no longer true, as it was in Coubertin's day, that the champion can emerge, train, establish himself and give the full measure of his potentialities —which is properly not only his individual vocation but also his rôle in society—in that state of independence of, and indifference to, the economic contingencies—or rather necessities—of ordinary life which confers what is called amateur status, and which at the time Pierre de Coubertin no doubt considered essential to the spirit of the Olympic Games.

THOUGH amateurism is the right thing for the general run of those who practise sports, to try to make amateur status obligatory for the élite of the sports world means—with certain exceptions that prove the rule—imposing falsehood on that élite. In this respect, we must be honest enough to admit that the ethical concepts of Pierre de Coubertin relate to a social situation and a stage in the technical development of sport which are now out of date.

Nor were they those of Ancient Greece, for apart from the fact that the democracies of antiquity secured leisure for their citizens at the price of slave labour, the Olympic victors were what we today should call "State athletes." The social conditions and sports technique which gave Pierre de Coubertin his frame of reference were those of his time—of Victorian England and, in general, of the middle-class Europe of the early decades of this century.

Today it is practically impossible for the champion to emerge from the rank and file of sportsmen unless special arrangements are made for him to become a State athlete or a university athlete or an athlete sponsored by some commercial firm. Strictly speaking, he is no longer really an amateur at all.

Why should we be so reluctant to admit that he is a professional? Is an artist—a painter, musician or writer—disqualified because he receives a fee? Why should we



MUSEUM OF SPO

The development of sport down the ages is shown in pictures and exhibits of sporting gear at Stockholm's Museum of Sport which was opened in 1947. Left, the impressive " armour plate " worn

think that money (or some equivalent material gain) dishonours athletic champions when it does not dishonour poets?

In point of fact, it is falsehood that dishonours; and it is high time, in my opinion, to admit what everyone knows to be the truth; that most champions and budding champions at best observe only the strict letter of the outmoded standards of amateur status.

The problem of the champion and the future champion is not whether or not they are professionals. The real problem, in practical and social terms, is that while practising sport for a few years as a virtual profession, they must at the same time learn another for the not far distant day when they will no longer be physically able to keep up the championship standard. This difficulty is a very real one and deserves the fullest and most considerate study. Nor will it be easier to reach a fair solution if we deny the obvious fact that the champion is obliged to live the life of a professional athlete.

This is what I wished to say about the first point, namely the democratization of sport and the training of its élites. As for the second point—internationalism—no one will be surprised, I imagine, that for UNESCO this is a matter of vital importance. Here again we must have the courage to look squarely at the facts and say frankly what we see.

Sport has, of course, developed on an extraordinarily wide scale. It is probably the aspect of modern life which is most widely encountered throughout the world —the only one, perhaps, which is common to both industrialized communities and developing countries. It is also, in a steadily increasing degree, one of the most vigorous forces in international relations. There are few international exchanges, encounters or contacts which arouse so much mass feeling as sports events.

But though it is becoming more and more international in fact, is present-day sport truly international in spirit, as Coubertin thought and wished it to be? There are, unfortunately, plenty of reasons to doubt that it is. In point of fact, nationalism, chauvinism and even racism are more and more apt to win—or should we say lose?—the day in international sports events. The passions and emotions that these events arouse and that are amplified and broadcast to the four corners of the earth by the powerful modern mass media of the press, radio, television and cinema, are but rarely inspired, it must be acknowledged, by the ancient moral law and social virtues once presided over by Zeus Philios, god of friendship. It is high time to act if we wish to prevent the Altis of Olympia from degenerating into the Roman Circus or the Hippodrome of Byzantium.

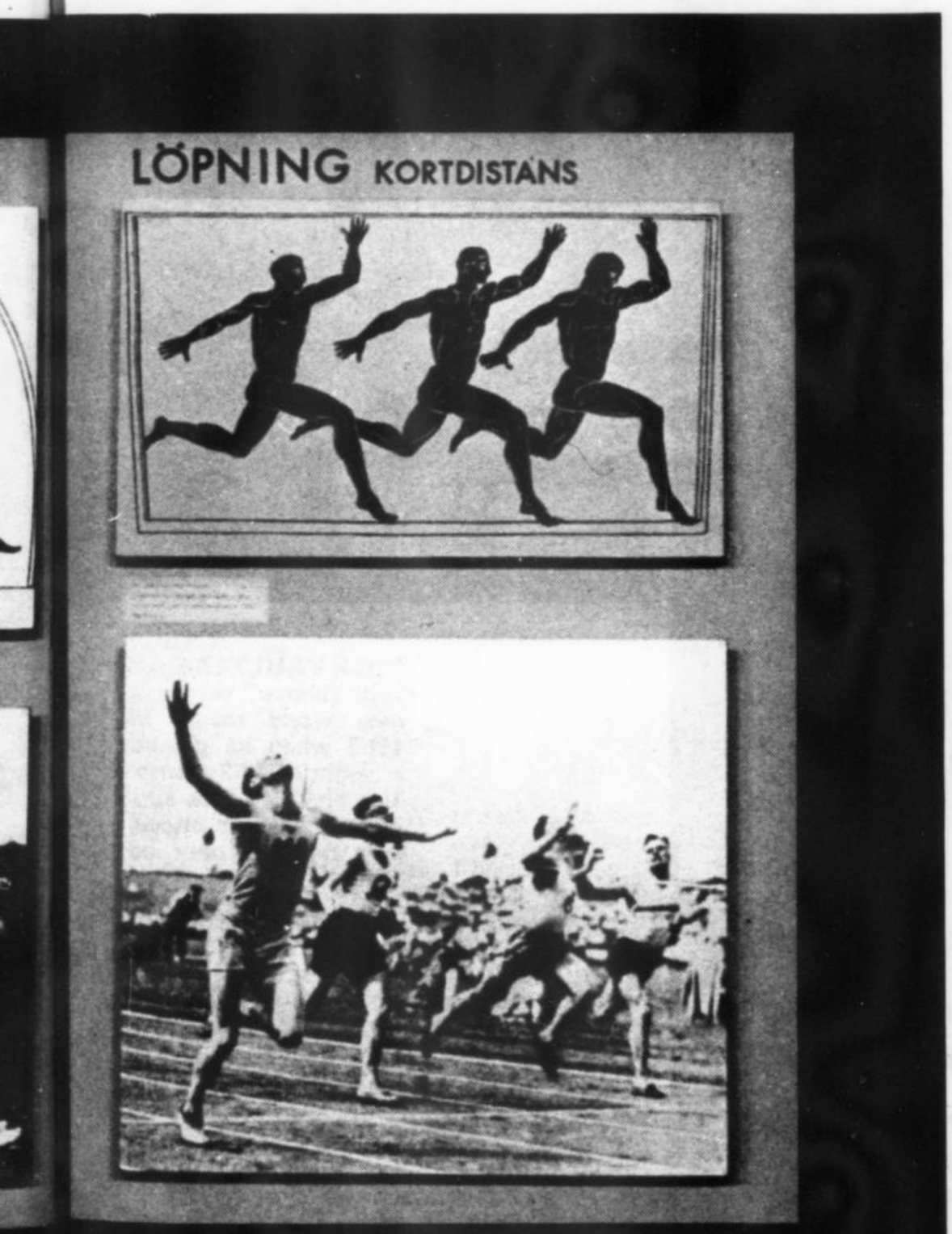
LET my meaning be clear. I am not suggesting that we should try to curb the emotional appeal of the sport event, which has become the great popular drama of our time. This would be absurd, and for that matter, impossible. One of the functions of such events, and certainly among the most salutary, is the same, though at a much higher degree of intensity, as that assigned by Aristotle to all drama: the well-known catharsis, the purging of passions and instincts. Nor can there be any question of trying to deprive the athlete of the admiration he receives, especially from his fellow-countrymen. Like any other form of excellence, athletic feats deserve to be admired, and it is natural for those who have most in common with the victorious athlete to feel this unquestionably fine sentiment more strongly than others.

But just as no sports contest can fail to stimulate the desire for victory, so none can be without rules and ethics. It is these rules and the ethics which inspire them that distinguish sport from the savage struggle for life whose name is war. It is compliance with these norms that transforms a feat into a virtue, and since these norms are by definition universal, it follows that although the feat may be ascribed to a given country, the virtue itself belongs to man.

What is more barbaric than this identification of the public with the champion, this appropriation by a nation of the victory won by an individual or by a team? These flags, these anthems, these banner headlines in the newspapers, screaming "We won..." or "National defeat," must surely seem to us a monstrous exaggeration of the spontaneous reactions of the crowd, even a shameful exploitation of its most generous impulses. In any case, this is the opposite of catharsis: it is nothing less than a return to a primitive outlook.

I think the time has come for an energetic reaction, including the abandonment of certain practices which have become part and parcel of the Olympic Games, either with the consent of Coubertin—such as the singing of national anthems—or in spite of him—such as the classifications by nations, which, as we know, is not officially recognized. Only in this way can we hope to restore sport, and by this I mean sport as a whole, including athletes, organizers and spectators, to its international vocation of promoting friendship among the peoples.

Is this too much to ask? I am certain that Coubertin would be the first to denounce the deviations from his creation and the chauvinistic exploitations of it. In 1935 writing about international sports events, he affirmed: "We must reach the stage where applause on such occasions—and with even greater reason at the Olympic Games—is given purely for the feats themselves, to the exclusion of any national preference. There should be a truce to all exclusively national feelings; these should be, as it were, 'temporarily suspended'."



SPORTING HISTORY

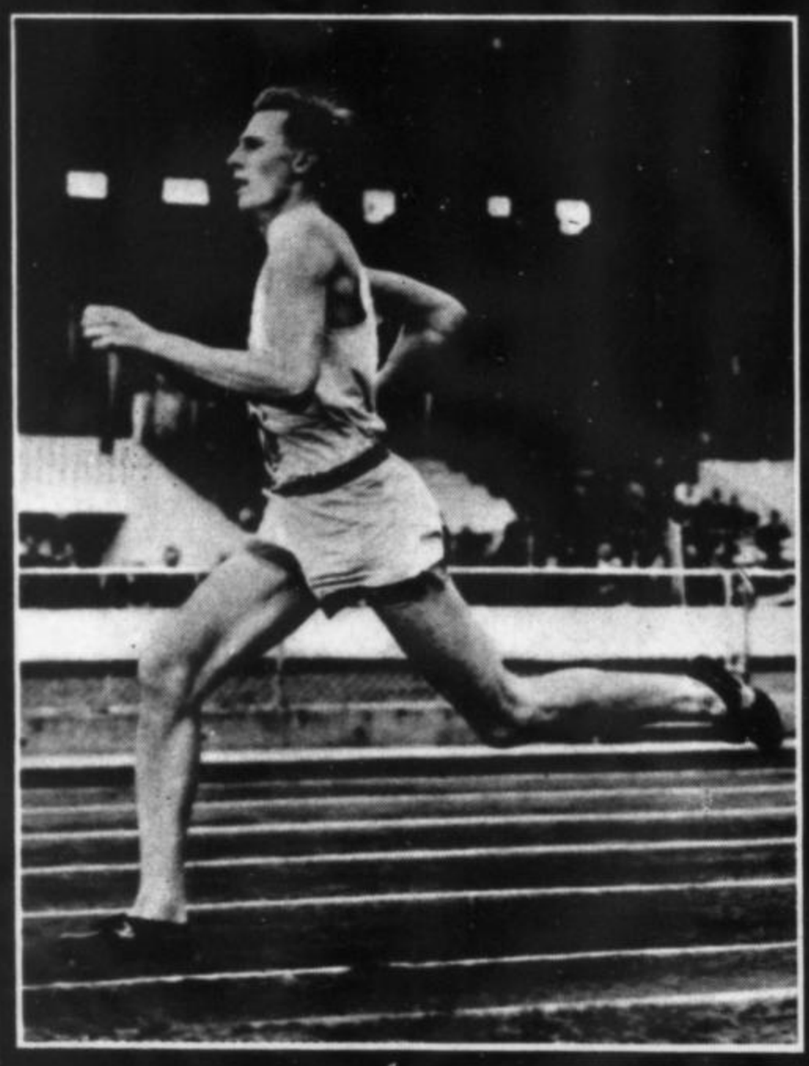
in the 19th century by the goalkeeper of an ice-hockey team. Above, comparative images show that in the world's oldest sport, running, movement and style are still the same as in Antiquity.

Photos © Paul Almasy, Paris

WHAT MAKES THE ATHLETE RUN?

by Roger G. Bannister

The following article is abridged from the address entitled " The meaning of Athletic Performance " given by Dr. Roger G. Bannister at the recent international conference called in Paris by the International Council of Sport and Physical Education. An English track middle-distance runner, Roger Bannister was the first athlete in the world to run one mile in under four minutes (in 1954). A medical doctor, he is the author of "First Four Minutes" published in 1955. Right, an action shot of Roger Bannister on the track.



POLE VAULTER Dave Tork (above) set up a new world record in 1962 when he cleared a height of 4.92 metres. This photo of Tork during a trial jump shows him at the instant he swings over the bar.

Photos © Associated Press

How is it possible to describe the meaning of what we enjoy, whether it be Mozart, Cézanne or sport? One would need to be a sociologist and philosopher as well as a doctor to do justice to this subject. At the centre is the problem of a mind-body relationship, and considering our relative ignorance about the workings both of the body and the mind, it is hardly surprising that the relationship between the two of them should stretch us to our limits of comprehension.

I can still remember quite vividly a time when as a child I ran barefoot along damp, firm sand by the seashore. The air there had a special quality, as if it had a life of its own. The sound of breakers on the shore shut out all others, and I was startled and almost frightened by the tremendous excitement a few steps could create. It was an intense moment of discovery of a source of power and beauty that one previously hardly dreamt existed.

Now a scientist may attempt an objective explanation of all this. The sense of exercise is an extra sense, or perhaps a subtle combination of all the others. It is one which many ignore; although the Englishman has always had the reputation abroad for playing games with an intensity he seldom devotes to real life.

When we exercise, small electrical impulses pass all the time between our contracting muscles, our moving joints and our brains. The pattern of the electrical disturbance in the brain is presumably a source of pleasure, because, like that caused by music, it has some interplay with rhythms inherent in our own nervous systems. But no explanation is satisfying that does not take account of subtler feelings. I think the scientific attempt is just about as successful as trying to describe a rose to someone who has never seen one.

For an athlete the mystery of this simple situation always remains. He cannot explain it further, or if he could, he probably would not run well any more. He would not need to. The paradox is as simple as that.

It is now some years since I competed in any track race, and so perhaps now I can make a little more sense out of it all. Like life, the problems of sport and a sporting career only make sense in retrospect. What significance does sport have for the individual? I think, early on, adolescence can often be a time of conflict and bewilderment, and these years can be weathered more successfully if a boy develops some demanding activity that tests to the limit his body as well as his mind.

Each adolescent has to find this demanding activity for himself. It may be mountain-climbing, running or sailing, or it may be something quite different. It may not even be sport at all. But by absorption in this pursuit,

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Where the losers are also the winners

he forgets himself and it fills the void between the child and the man. And later, when he finds a career or some other loves, he will be surprised at the extent to which he has grown. By then, he is no longer in a position to make the sacrifices which he previously hardly noticed.

The meaning of games as opposed to simple physical exertion is an even more difficult problem. Our satisfaction from games is a complex one. We enjoy struggling to get the best out of ourselves, whether we play games of skill requiring quickness of eye and deftness of touch, or games of effort and endurance like athletics. There is a desire to find in sport a companionship with kindred people. Friendships which are formed under this baptism of fire, if I can use that phrase, have a curious permanence. I know that I have found all these things.

The sportsman can certainly enjoy his sport even if he has no prospect of becoming a champion. In fact, it may be thought of in the sense that an unsuccessful sportsman is perhaps the truest sportsman of all, because his love of sport is for its own sake and untarnished by any thought of success.

But the formative influence of sport on character does not end there. Sooner or later in sport, the serious striver after some sort of excellence will meet a situation that is almost too big for him to master. Such situations occur in ordinary life, and can often be dodged. We can play hide-and-seek with reality, avoiding facing the truth about ourselves; but in sport we cannot do this. It shakes our roots with its confusing pattern of success and failure.

As a result, sport leads to the most remarkable self-discovery, of limitations as well as of abilities. This discovery is partly physical—one learns, for example, that feeling tired does not mean that one is reaching the limit of exhaustion. But mainly the discovery is mental and brought about by the stresses which sport imposes. The self-discovery is most rapid if we set out on the early stages of this journey alone.

In time we learn how far from being self-sufficient we are, we realize the value of co-operation and assistance from others. But unless we start out alone, we never learn the questions others can best answer and those which we must answer for ourselves.

Svenska Turisttrafikförbundet

SNAKE OF SKIERS. Last year a record number of 3,886 skiers took part in Sweden's Vasa Ski Race, an annual commemoration of an incident in the country's struggle for independence led by Gustav Vasa in 1521. Right, skiers from seven nations set off on this 55-mile race while a mass of others (top of photo) wait their turn. The record time for the course (4 hours, 45 minutes, 10 seconds) was set up in 1961. Above, the ramp of the ski jump at Ornskoldsvik in Sweden is so close to the town that this skier seems to be gliding over the roofs. Ski-ing is said to have originated in Scandinavia and from being simply a means of transport has now become one of the most popular of winter sports.

To many of us, action may not come easily. We can allow ourselves to be blown along like leaves in a wind, or on the other hand, we can try to impose our own will on external events. For all of us there comes sometime a moment when we are called upon to face the metaphorical equivalent of a starting pistol. Trying to bring the finishing tape nearer us, which we sometimes may do in later life, is the alternative and direct contrast to what the athlete is attempting to do, attempting to reach a rather idealistic goal more swiftly.

These are my reasons for reiterating in a modern context Baron de Coubertin's views of the educational necessity of sport, as he conceived it, on a universal scale. There is no section of any community that cannot benefit, except the most socially impoverished one, and even under these circumstances the prospect of international competition may act as a spur to enlightenment and progress. Physical deformity is not a barrier, as Dr. Guttmann has shown by his Olympic Games for men and women who have lost the power and use of their legs, so-called paraplegics, giving the Games the name "the Para-Olympics."

Sport is a vital part of maturity too. There may be deeper reasons for its satisfaction that we hardly dare admit to ourselves; some reasons that lie locked away in the more primitive part of our minds. Thoreau once commented "the majority of men lead lives of quiet desperation." We may strap-hang in the morning travelling to work to reach our polished world of desk-top size, or we may tighten endlessly nuts on a new motor-car, but we all of us must still seek instinctively some of the freedom our far-off ancestors knew.

The meaning of physical exertion to the individual is difficult to disentangle from its sociological meaning. The need for adventure may at first have been satisfied by the struggle for survival. But now that natural dangers have been mainly conquered, we all of us seek further trials. And unless men find them, is it not possible that they may rebel with some form of shocking violence? Is it not possible that a drift towards crime may be the result of the thwarting of these impulses? Breathes there a man with soul so dead that he has lost the urge to impress on the world some indelible mark of his personality?

In sport man finds a trial for life which is more active than a game of chess, more exciting than digging his garden. We have used machines to conquer land, sea and air. Athletes realize that if this quest for speed is worthwhile, it might as well take place too on the running-track. There we can still feel our bodies have a skill and energy of their own, apart from the man-made

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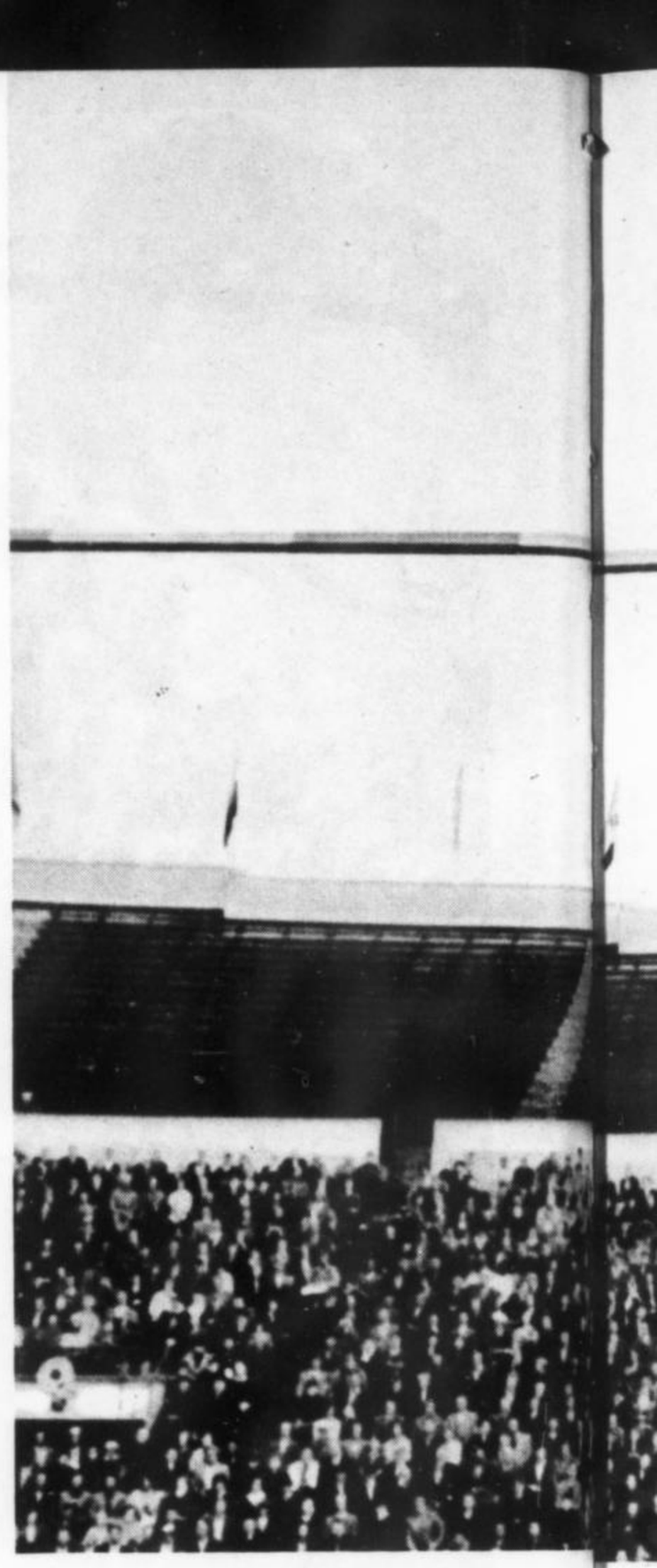
© Associated Press

For the favourite the heat is always on

machines which they spend their time driving. There we can fight a pitched battle against the claustrophobia of our time. The new Don Quixote can tilt a vaulter's fifteen-foot pole at the crazy windmill of modern life, or defiantly hurl his fifteen-pound shot.

I believe that a collective restlessness, even violence can safely extinguish itself in the games we play. Sport provides an alternative to the drag of passive leisure. It provides an outlet for the craving for freedom, an outlet which will become more important, the more restricted, artificial and mechanized our society becomes.

And of all sports, I think, athletics has great advantages. You can do it in your own time, whether you work during the day or night. You can choose your own event among the many which suit different physiques, the long and thin, the broad and strong. While most ball games demand great natural aptitude, this, I think, is less important than industry and perseverance. Except in terms of energy and effort, athletics costs no more than a pair of running-shoes, and no one can say you may not run faster than this or jump higher than that. The track is yours and there is no limit.



HIGH JUMPER. Valery Brumel seems to be floating effortlessly over the bar as he clears a height of 2.27 metres in the vast Lenin Stadium at Loujinki, Moscow. Brumel is world champion with a record breaking jump of 2.28 metres.

So far I have talked about the meaning of physical exertion and of competition as a form of self-trial. The excellence of the performance in absolute standards is hardly relevant to its value in character building. It is a relative matter, the victory being over self and previous performance or over fellow-competitors of comparable standard rather than against an arbitrary standard or a record. What is it like to have the excitement of competitive struggle grafted on the natural freedom found in movement—to champion the cause of club or country and to have their honour as well as your own at stake?

What effect does the roar of a crowd of 50,000 people in a stadium have, crying out for more effort and identifying themselves with each runner's success or failure? What does it mean to wait weeks or months for a race which may last only a few minutes or even seconds—to travel thousands of miles for a few seconds of supreme exertion. For me, and I think for all athletes, the Olympic Games have a special place on a plane apart from all other races, all other competitions, national or international. In past, this stems from the authenticity of the games and from their roots in prehistory.

The ancient Olympic Games, historians have suggested, emerged from a primitive anxiety lest with winter the earth might never come to life again. With soil bare and food scarce, who could give an assurance that another year would bring a fresh harvest? The saviour of the harvest was the person with the magic of victory in him, the athlete born of Zeus the Sky God. And, for a time, the simple foot race was the way to choose this man. Later the search broadened for the man who embodied the Roman word "virtus," goodness or excellence.

The modern Olympic Games have still tended to produce a champion of champions—a Numi, a Zatopek, an Elliot—a modern hero, not altogether shorn of magic, emerging as a symbol of the Games. We still need him as a reminder that both body and mind can fuse in this highest athletic achievement.

R. Caloz

INFIRMITY NO HANDICAP

Physical infirmity is not necessarily an insuperable barrier to sporting activity. Sportsmen and sportswomen, so incapacitated by accidents or serious illness that any possibility of their entering competitions seemed out of the question, have regained their physical powers and even improved on their previous performances. An example of this was seen at the 1952 Olympic Games in Helsinki where a silver medal for equitation was awarded to a woman rider, Lis Hartel, who eight years before had suffered a serious attack of polio. It took her years to re-educate the muscles of her paralyzed legs. Ignoring advice she had herself lifted on to her horse to recommence her training. Her participation in the Olympics was in every sense a challenge to adversity and her success was an example and an encouragement to all physically infirm people. Another example of courage in the face of physical handicaps are the "Para-Olympics", the sporting events which have been organized for paraplegics—those who have lost the power and use of their legs.

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For a moment I want to consider what Olympic competition itself means to athletes who are taking part, and to do this, I divide Olympic athletes, arbitrarily, but I hope not unkindly, into three groups. The first, those who have barely secured a place in their national team and are certain to be outclassed; secondly, those who have a sporting chance of a medal, and thirdly the favourites for victory.

The first group with no chance of a medal are, strange to say, in a way to be envied, for to him whom least, in a relative sense, has been given, least is expected. Not that they are indifferent athletes—far from it, they have fought hard to win a place in their team. Though they are free to experience the Olympic competition, these athletes perhaps do not savour the real quintessence of the Olympics.

THE athlete with a chance of a medal is happily placed. He is in a position of strength; he has nothing to lose and everything to gain. He can respect and know close rivals. He has suspense, climax and reactions and will never forget the experience. The public at large hears about the risks, the international skirmishes and silly nonsenses. It never hears of the unspoken understanding that exists between such athletes whose skill as craftsmen can compel a mutual respect no matter what their eccentricities of character or disparity in politics. This has been said often but it can be said again.

At the apex of the pyramid comes the favourite. His public and press expect a gold medal through him. But it is a matter of simple arithmetic that most favourites will return home without one. I think a favourite who does not win knows as much as anyone about Olympic spirit. A favourite for an Olympic title needs stoicism and self-confidence to bear his burden lightly and shed humour and good advice over a team that may look to him for leadership. Perhaps it is understandable if his joviality on departure seems a little forced, his light-heartedness a piece of play-acting as he waves from the aeroplane steps.

In the short space of two weeks his experience is going to be stretched to the limit of what is tolerable. He will reveal to himself and perhaps to others unsuspected weaknesses, but perhaps discover too a new secret strength. For once in his life he is utterly alone. This situation is all important, immediate and irrevocable. A lifetime's intensity seems to be packed into a few moments. The favourite, win or lose, can never be the same again. And likely as not it may help him to do something else better.

By the time he has reached this point, if he happens to be a track middle-distance runner, he will already have come tantalizingly close to achieving a mastery over himself which it is the aim of every athlete to achieve. He will have learnt to channel his whole energy, mental and physical into a few moments. He will perhaps have mastered the art of finding in himself more than he has got.

This, like the knack of riding a bicycle, involves a mental trick. The secret is to lose for a moment one's sense of proportion. This process, in the greatest athlete, unleashes a will to win that remains locked away in his rivals. The presence, or absence, of this is one factor that sets the razor's edge between victory and defeat. The other is some mystical fortune that smiles on a victor

CONT'D ON NEXT PAGE

The athlete who is paid is no less a sportsman

and which makes those who were defeated curiously happy for the victor.

For a moment now I want to turn to another aspect of sport which has I think changed considerably since de Coubertin's day. This is the extent to which sportsmen should be encouraged or permitted to risk their lives. Qualities of decision and boldness are necessary in all sports, but boldness can easily become recklessness, even ruthlessness, and this change spells disaster.

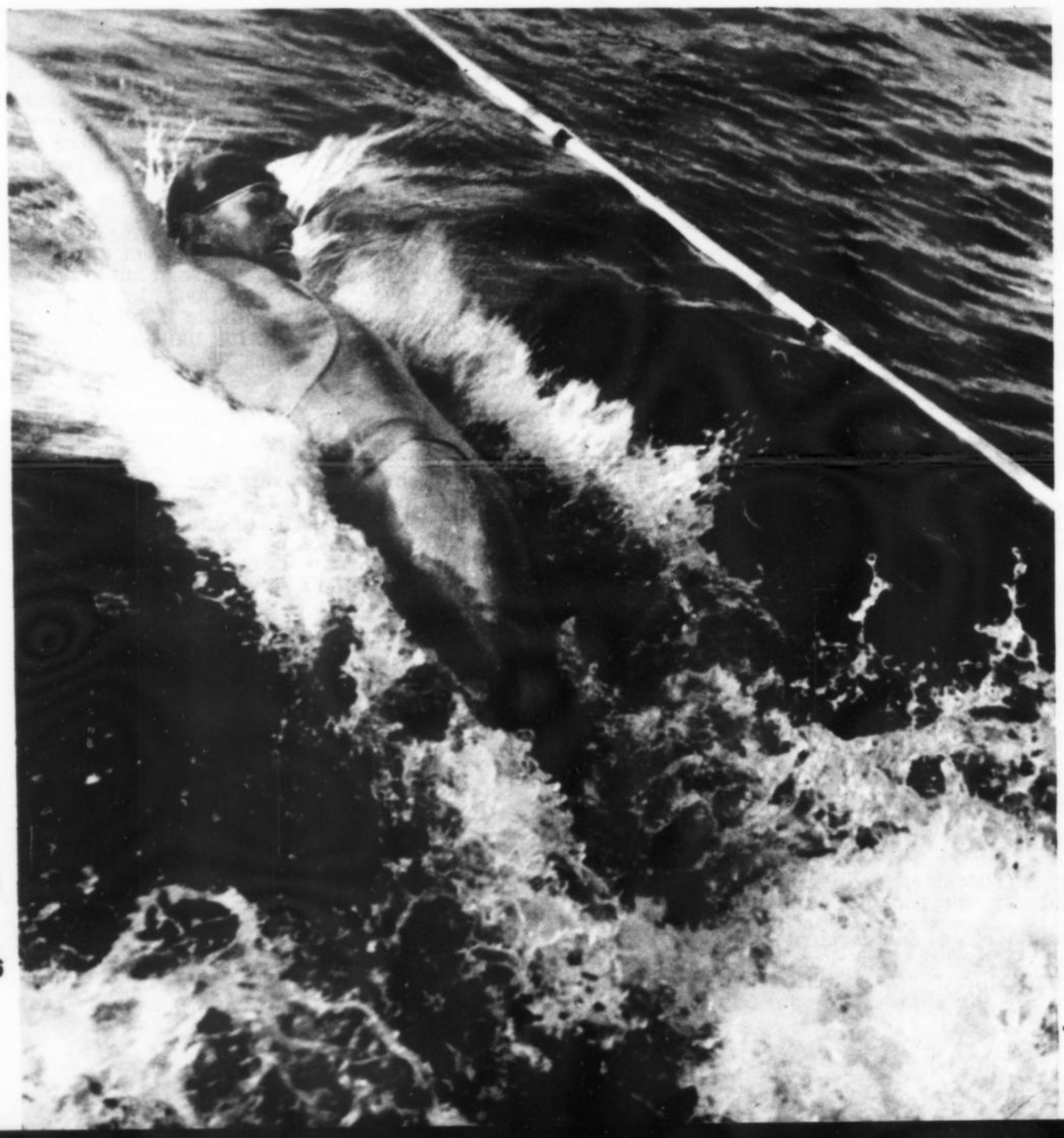
TODAY in some sports risk seems to me to have overshadowed skill. Eighty-three people were killed at Le Mans in 1955. A few days before his death in the Mille Miglia, the Marquis of Portago summed up his racing philosophy: "Racing is a vice and as such extremely hard to give up. One can be at the top one second but all it requires is a very small error and one is very embrassingly dead the next."

I think such sportsmen are terrified by what they do, but their fear, instead of paralysing them, galvanizes them to fresh action, as sometimes occurs on the battlefield. Climbing accidents present another problem. A few years ago, two French students were stranded near Chamonix. Sixteen climbers risked their lives in rescue attempts costing more than £150,000.

In searching for a definition of legitimate risk in sport, certain distinctions must be made. In many sports there is near criminal negligence by braggarts who underrate the dangers of fast driving on unknown roads or swimming beyond warning flags. In Britain there are more than 3,000 people a year killed in car accidents and 1,000 are drowned. People try to climb mountains equipped with a bar of chocolate and an orange, or sail tiny craft they cannot manage. This is folly not sport and should be condemned.

There is an unhealthy element among spectators in many of these sports too that is disturbing. In motor-racing, how many spectators are attracted as much by the morbid anticipation of disaster as by the skill of the driver. On a different scale, a small boy once expressed his profound disappointment after the finish of one of my races. "He's no good today, he hasn't even fainted," he said. Was it morbid interest or merely ignorance that led a woman spectator at Melbourne to exclaim on seeing the Olympic marathon runners stagger home "the final of this should be worth watching?"

Having said all this about unnecessary risks, let me confess that I have respect for sportsmen who, having



Although American colonists played a kind of baseball as early as 1762, it is only just over 120 years since it became a popular game with a standard set of rules. Today it draws enthusiastic crowds in Cuba as well as Japan.

Though swimming is a sport as old as the most ancient records of history, it was not one of the events in the ancient Greek Olympic Games, though it was included in the first Olympic Games of modern times in 1896. It has been said that all living creatures except men and monkeys can swim by instinct. Men, however, have learned as an art what they lacked by instinct and have developed many ways of swimming, including the backstroke (left). Olympic events include free style, back, breast and butterfly strokes.

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excluded danger as much as possible, nevertheless risk their lives in an attempt to extend the boundaries of human achievement. No one but a fool risks his life lightly, but thinking men with daring, even if they do not always advance our practical knowledge of machines or nature, raise the standard of individual vigour and enterprise upon which the survival of mankind as a species depends.

The factors which lead a man to stake his skill against his life must include factors which are far beyond his own self-interest. Thoughtful courage cannot and should not be eliminated from life, and those of us with children must accept that they will be the better for having faced danger, and we must if necessary be prepared to see them do so.

The last decade has covered a strange period in the history of sport. It has been the emergence of the new professionalism, not only in the sense of direct and indirect payment for sports, but also in devoting unlimited time and energy to sport, to the total exclusion of any other career—which Borotra has rightly deplored.

EVERY country seeks to enhance national prestige by physical achievements. It may be in establishing new jet plane records of speed or altitude, penetrating the depths of the sea, or scaling the world's highest mountains. Too few questions seem to be asked about the means and the motives, provided the end of national glory is achieved.

Running, less than any other branch of track and field athletics, perhaps less than any other sport refuses to be distorted to fit into a pattern of this kind. Eighteen years ago, when Zatopek first ran 60 quarter miles in 60 seconds in a single training session, I wondered whether it was still possible to be an international athlete any more and do anything except training. But odd as it may seem, no one has yet proved to my satisfaction that middle-distance running cannot still be an activity upon which it is neither necessary nor desirable to spend unlimited time and energy.

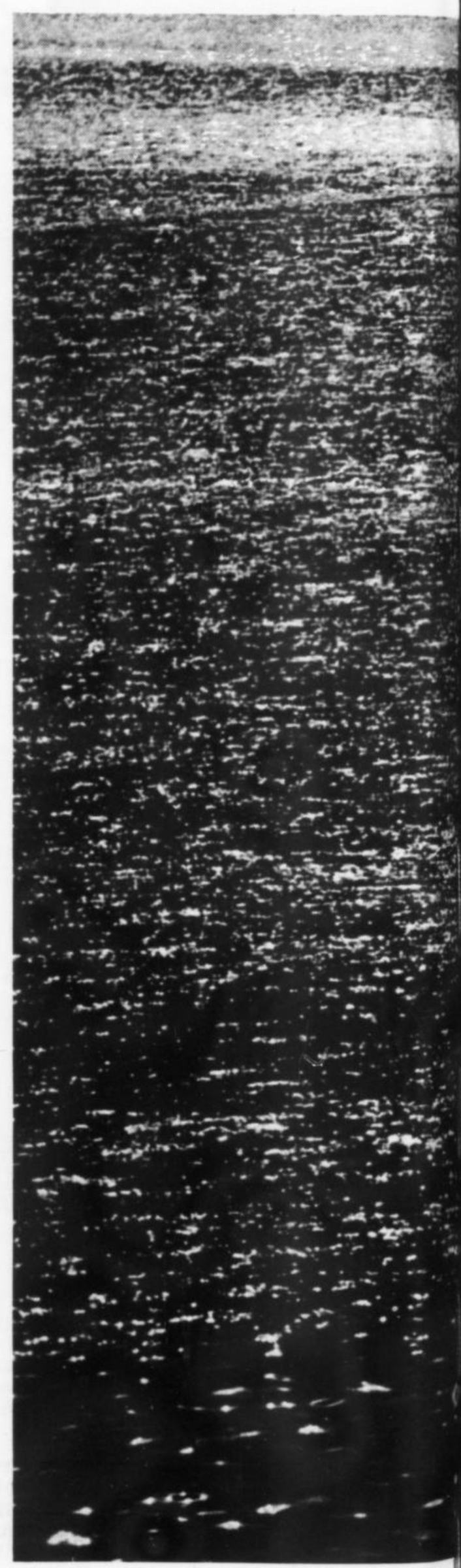
Fitting sport into the rest of life until one's work becomes too demanding—this is both the burden and joy of the old-fashioned amateur, a path which any athlete is still free to choose, however difficult or rare it may be. The athlete who chooses to be paid for sport is no less truly a sportsman. He too has a choice and often exchanges some short-term advantages for many long-term problems. I think it is our duty to see that he realizes this.

I think sport will survive the ethical and administrative problems that now beset it. And the reason is this. Sport has an individual basis and an individual meaning, and is not a national or moral affair. We run not because our country needs fame, nor yet because we think it is doing us good, but because we enjoy it and cannot help ourselves. It gives each of us the chance to release a power that might otherwise remain locked away inside ourselves.

I am sure that this urge to struggle lies latent in everyone, and the more restricted our lives become in other ways, the more necessary it will be to find some outlet for this craving for freedom. No one can say "You must not run faster than this or jump higher than that." The sportsman is consciously or unconsciously seeking the deep satisfaction, the sense of personal dignity which comes when body and mind are fully co-ordinated and they have achieved mastery over themselves.

For a young man there are still few fields in which such perfection can be approached and with such momentary if transient finality. For the athlete the human spirit is indeed indomitable.

THE GRACE AND BEAUTY OF SPORTS



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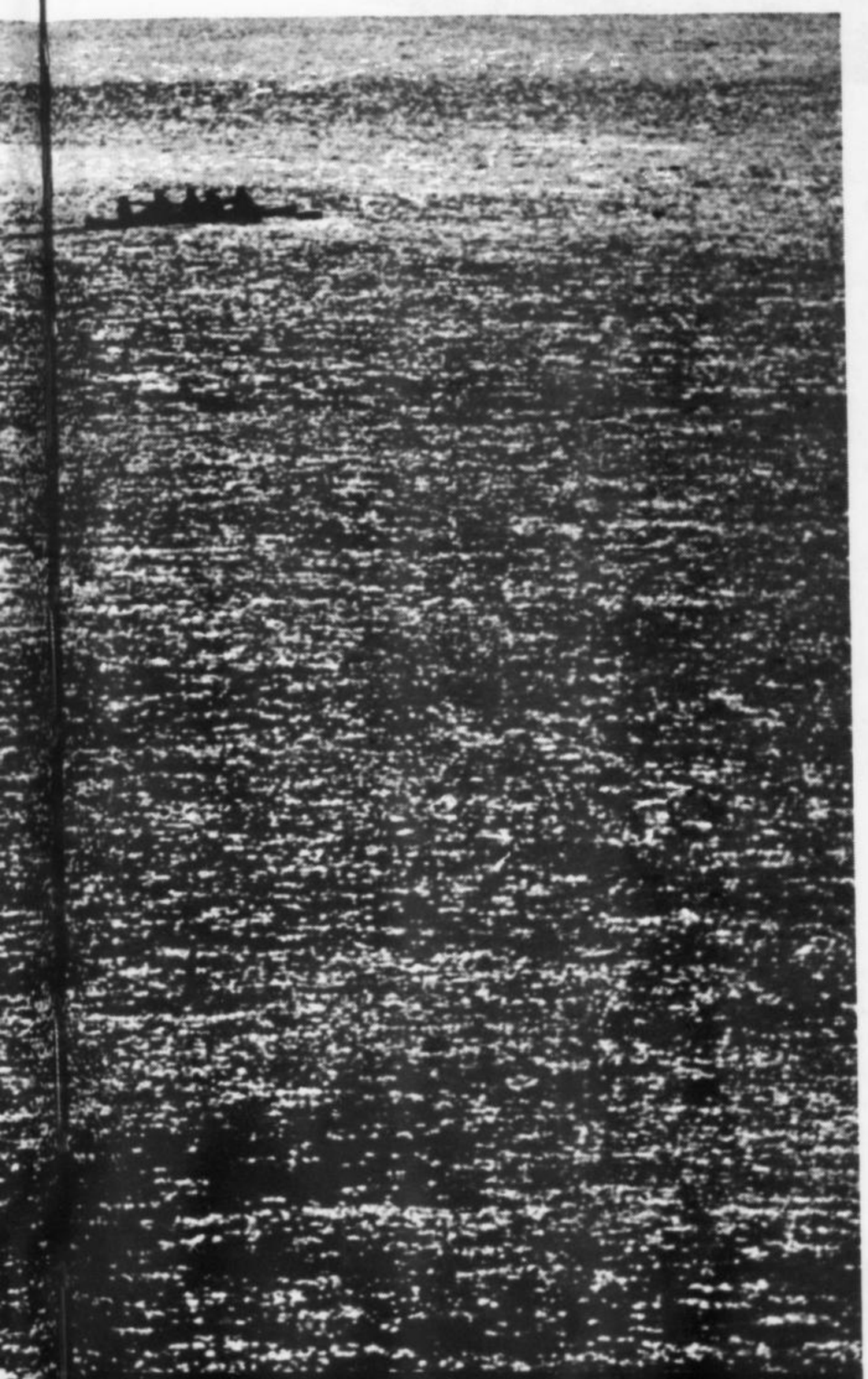
Photos © Paul Almasy, Paris



The ancient Greeks of Olympic times were passionately interested in athletic sport because they saw in it a means to develop the human body, men's character and ideals of fair play. But above and beyond this they loved sport for its grace and beauty. Greek sculptors have left us countless memorials glorifying the movements of the javelin thrower, the discus hurler and the marathon runner. On this page the arrested motion of modern grace in sport. Left, Wilma Rudolf, known as the "dark gazelle" 1960 Olympic champion who ran 100 metres in 11.3 secs.

© Dalmas

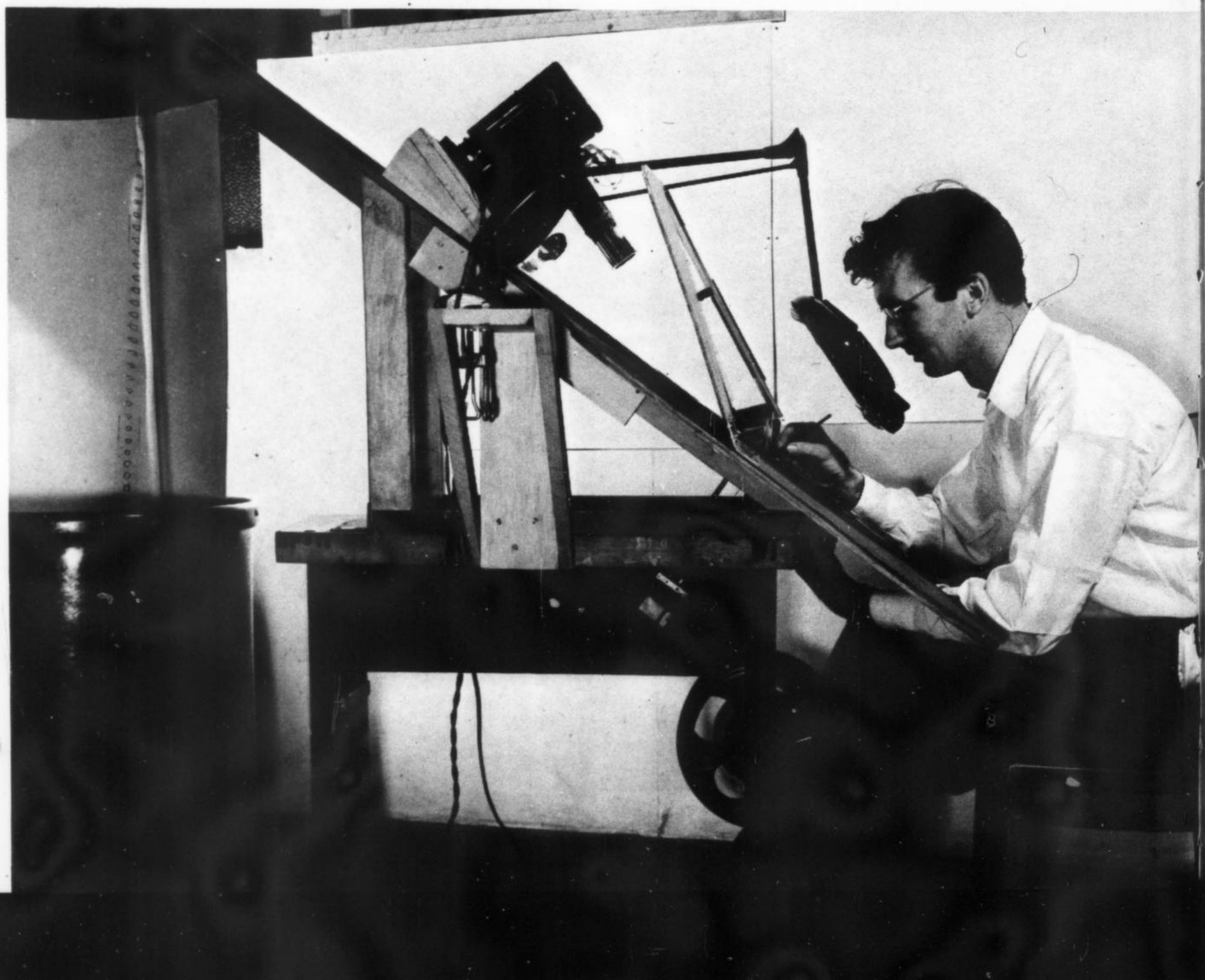
ETCHCRAFT ON CELLULOID

by Anne MacDermot

With a shrinking world and a growing desire on the part of all of us to "learn the other man's language" so we can communicate with each other, many people look at a shy film-maker who speaks to people in 53 countries and wonder how he does it.

For more than 20 years Norman McLaren has been working out of Canada's National Film Board. In this time he has produced a stream of short films that have caught the attention of film audiences all over the world. No-one can ignore a McLaren film. You are either delighted, startled, or enraged. And yet their impact is not in words—McLaren speaks without using words—and not in length—the films are seldom more than five minutes long. He does not preach. The purpose of his films? "To give the intellect a rest," McLaren says. And yet these little films do have a message of beauty, of humour, of peace. More than that, they betray their creator as "one of the film world's gentlest people."

It all started when he was a young student. Born in Scotland, in 1914, McLaren went to Glasgow for art training. Like others at that time, he became fascinated with the possibilities of a comparatively new toy called film. He could not afford a camera so one day he got hold of an old print, washed off the emulsion and, taking a brush and coloured inks, painted his own strip of films directly on the clear celluloid. The result, "Colour Cocktail," was awarded a prize by the acknowledged doyen of British documentaries, John Grierson. McLaren went to London and with the General Post Office Film Unit produced a series of short, vivid films: "Hell Unltd," "Book Bargain," "Mony a Pickle," "Love on the Wing."



DIRECT ANIMATION With their direct appeal to eye and ear, the cartoons of Norman McLaren have cut clear across language barriers in all parts of the world. In his works, McLaren speaks, but without using words, and draws his cartoons directly on to the film itself. Left, the animator at work. His technique is one of direct animation for he uses no camera but simply an ordinary pen and Indian ink. Right, McLaren's apparatus which holds the film while he draws. It reflects the image of the figure just drawn on to the frame on which he is now working. The sheet in the background with numbers indicates the length of each sequence of action in the film.

Photos : National Film Board of Canada

He moved to New York and there turned out "Allegro," "Sherzo," "Loops," "Rhumba," and "Boogie Doodle." In 1939, John Grierson once again stepped into his life. He was asked to go to Ottawa where the dynamic Grierson was building up what is today the Film Board. McLaren accepted the job as head of the Animation Department, on condition that he be given freedom to go on experimenting with hand-painted films. In the decade that followed he was to turn out some of his best-loved films.

What are they like? As the Film Board began to distribute McLaren's films dozing theatre-goers in such distant points as Rome, Johannesburg, Washington were jolted out, of their seats by a small explosion on the screen in front of them. Showers of sparks, stars and whirling snowflakes rained down and the audience hardly had time to catch its breath before the film stopped, as abruptly as it began, like a giant Roman candle dropping its last star into the night.

"Fiddle-de-Dee," for instance, is a cavalcade of riotous colour. The images McLaren has painted on each film-square, dance and streak across the screen to the wild accompaniment of an old-time fiddler. "Begone Dull Care" is a beautiful blues evocation set to the music of jazz pianist Oscar Peterson. "Hen Hop" is a joyful little film in which a hen motif leaps and bounds in a tricky jive step.

McLaren made all of these by working on the film base, frame by frame, etching, painting, counting squares to synchronize them with the soundtrack. People inside and outside the Film Board began coming to see how he did it. He would show anyone who wanted to learn. In fact his generous help, even during periods of frantic production, have made him a legendary figure of thoughtfulness among colleagues (it was Grierson who called him one of the film-world's gentlest people.) Few have managed the concentration of hand and eye that go into McLaren's intricate films. One thing, however, became apparent.

McLaren's films had a direct and immediate appeal to the eye and ear, regardless of language. Also this one-man film producer had succeeded in turning out films without the need of cameras, scripting, cutting and all the other complicated processes that go into most cinema production.

In 1949, his abilities were called upon by UNESCO. McLaren joined a team to work on an experiment in visual education in West China. Called "The Healthy Village," the project was designed to teach people who couldn't read or write some of the rules of health.

From a cupboard in the Montreal offices of the Film Board where I visited him, Norman McLaren pulled out some of the work his pupils did at that time.

"The Chinese have a fine feeling for form," he said, holding up a strip of film. "They are good draftsmen. Here's a film strip, for instance, on 'Safe Water - Safe Food.'"

He held it up to the light and showed the delicate

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A SAD, MYSTERIOUS scene taken from the film, "A Little Fantasy on a 19th Century Painting". The film brings to life a well-known work, "The Isle of the Dead" by Arnold Boecklin (a 19th century Swiss painter). It was made on the basis of a single black and white drawing which evolved as different elements were added or removed as shooting progressed.

ETCHCRAFT ON CELLULOID *(Cont'd)*

One-man film unit

etching against the black surface. In another film, there were beautiful colours, rich plum and royal blue.

He dug into the box he was holding. "These are animated drawings, done on rice paper. They show how a log of wood is cut, carved and made into a plough, step by step," he explained.

In China, McLaren had supervised 12 artists and showed them the graphic teaching value of poster, picture books, mobile devices, filmstrips, slides and finally, animated movies. While McLaren was in China the big change in government occurred, but he did not leave the project before a good number of Chinese who had never seen a film before were given the key to make their own productions.

Four years later, the government of India called upon him to give the same kind of lessons. In co-operation with UNESCO, McLaren spent three months in Delhi and three in Mysore. This time, the emphasis was on practical problems and in his Montreal office McLaren showed me some more samples: "The Rearing of Silk Worms," "Compost Manure," "The Treachery of the Money-Lender."

He remembers his students as serious and hard-working. One of them, a lad named Obaid-al-Haque, later came to Canada and spent a year with the Film Board.

It was after his trip to India that Norman McLaren produced what many consider his most powerful film. "Neighbours" is not the first film he had made using a camera (a series of delightful French Canadian folksongs, *C'est l'Aviron*, *La-Haut sur les Montagnes* and

Photos: National Film Board of Canada

FOLKSONG in the French-Canadian tradition, "Là-Haut sur les Montagnes" was one of a number of folklore cartoons produced by McLaren. These were made by photographing a series of pastel drawings.

NEIGHBOURS. Norman McLaren's film, "Neighbours" is a powerful satire on war. Two neighbours quarrel over a daisy growing between their gardens and end up by killing each other. The daisy blooms in the grass between their graves. This is McLaren's longest film, lasting nine minutes. He made it using a camera and live actors, but photographed them in puppet-like movements. These shots show the neighbours dancing round the daisy which is to become a futile motive for hatred and crime..

Poulette Grise had been made by photographing a succession of pastel paintings) but it was a new technique for McLaren in that he used live actors and photographed them in puppet-like movements which give the effect of very violent pantomime.

The film is McLaren's longest. It runs nine minutes and tells the story of two neighbours, sitting out in their back yards, chatting and reading the newspapers from their respective deckchairs. The mood changes when one glances down and notices a pretty little daisy growing in the grass between them. The other follows his glance. They both wonder to whom it belongs. Suspicion, hatred and fear flare up. The men grapple, attack each other's households, murder the wives and children and finally kill each other. In the end the daisy is blooming in the grass between their graves.

The film is undoubtedly the powerful comment on war McLaren intended it to be. It aroused a storm of international controversy, taking prizes at international film festivals but horriying some audiences.

The next time McLaren used the "pixillation" method (live figures photographed as for an animated cartoon) the film was "The Chairy Tale." Audiences once again chuckled with glee. There was no fighting in this one.

"'Rhythmetic" is another favorite and here McLaren uses cut-outs. Made to introduce school children to the business of learning numbers, and perhaps take some of the bogey out of "Now it's time for our arithmetic lesson", "Rhythmetic" is a rollicking little film in which numbers slide together, add, subtract, meet each other and re-group to make sums, until suddenly all is upset by a run-away zero which won't keep in line, sighs, deflates like a flat tyre, tips like a dizzy egg in an egg-cup.

For *La Merle* McLaren once again uses a traditional French folk tune (as in the popular "Fiddle-De-Dee") and the elegant little film has taken its share of prizes.

Music has always been as important to McLaren as the visual side. It is natural, perhaps, that he should have found a way of bringing it too under the supervision of the individual making the movie. He began experimenting with two little films, "Dots" and "Loops." By drawing with pen and Indian ink along the margin of 35 mm. film, where the soundtrack usually runs, he produced his own "music".

"This was a primitive method", McLaren explained some years ago. "After this we developed a system for producing a more refined kind of animated sound."

What he had designed was called a "composertron" and consisted of a complete set of cards representing the chromatic scale. When the cards were photographed to the left side of the film, where the soundtrack runs, they added up to a new kind of "music". The technique had been evolved to some extent by the Russians, Avzaamov and Rimsky-Korsakoff, the German, Rudolf Phenniger and two Englishmen, Jack Elliott and C. E. Buckle, McLaren used it for several passages in the film, "Blinkity Blank", and another Film Board producer, Maurice Blackburn, used animated sound as the fourth instrument in an ensemble for the McLaren film, "Phantasy."

By this time, McLaren's name had become known all round to the world in film circles. However, he hates personal publicity and found being famous a drawback. Like every true artist he is happiest at his own drawing board. There he continues to touch the imagination of people all around the world by sending out dancing little films that cross all boundaries.

COUNTDOWN FOR SPACE FLIGHT

by Evgeny P. Aksenov,
Evgeny Grebenikov
and
Vladimir Dyomin

"My eyes watched the clock. The hands pointed to seven minutes past nine... I heard a loud whistle and then a steadily increasing whine; the hull of the huge ship shuddered as slowly, very, very slowly, it rose from the launching pad. The struggle between the rocket and terrestrial gravitation had begun. The whine was actually no louder than the one you hear in the cockpit of a jet fighter but in it were countless musical notes and timbres that no composer has ever written down and that no human voice and no musical instrument have yet produced. The giant rocket motors were creating the music of the future..."

That is Yuri Gagarin's description of the take-off of spaceship Vostok I as it was boosted into orbit in outer space.

During the past five years dozens of artificial earth satellites have been put into orbit, automatic interplanetary stations have been launched in the direction of the Moon, Venus and Mars, and the first flights have been made in outer space by eleven men and one woman.

All these flights by manned and unmanned space vehicles would never have been successfully accomplished without complex and thorough planning and an astronomical number of calculations by thousands of engineers, chemists, mathematicians and other specialists.

A spaceship is boosted into an orbit around the earth by a powerful multi-stage rocket, each of the stages being itself an independent rocket. The multi-stage system has many advantages over a single-stage rocket which wastes some of its energy since it has to boost not only itself and the ship it carries but also continue to carry fuel containers that once they have been emptied become useless ballast. The most suitable type would be a huge one-stage rocket that casts off the containers as the fuel is used up, but technical difficulties have so far prevented the design of such a rocket. The one which comes closest to it is the multi-stage rocket used by the U.S.S.R. and the U.S.A. It consists of a series of rockets placed one behind the other; each of them is discarded when the fuel is exhausted, either automatically or by a signal sent from the ground.

On the initial stage of its journey the rocket rises vertically from the pad; then its direction gradually changes in accordance with a pre-set programme. After a flight that may last from eight to fifteen minutes the rocket attains a velocity of about eight kilometres a second; by this time its flight position is practically horizontal and thus parallel to the earth's surface.

Boosting a space vehicle into orbit involves loss of energy in overcoming the force of gravity. Average velocity losses at this stage amount to two or three kilometres a second. For a rocket-carried vehicle to be put into orbit, therefore, it must develop a speed which, in the absence of an atmosphere and of gravity, would be ten or eleven kilometres a second. The power the rocket must develop to reach this velocity naturally depends on the weight of the vehicle it is to put into orbit. For instance, Spaceship Vostok I weighed 4,725 kilogrammes and was put into orbit by rocket motors that developed 20,000,000 h.p.—ten times the capacity of the Boulder (Hoover) Power Station in the U.S.A. and three times that of the Bratsk Power Station in Siberia.

Once the carrier rocket has reached the computed velocity its last stage is automatically detached from the spaceship. The ship is now in free fall and from then on becomes a celestial body whose motion is determined by the laws of celestial mechanics. It is then said to be "in orbit."

For a space vehicle to remain in orbit around the earth it must travel at "orbital velocity" (or "first cosmic velocity" as Russian engineers term it) which is the minimum speed at which a body may move without being pulled back to earth by the force of gravity. Theoretically this velocity is 7,909 metres per second, computed at the earth's surface. If the programme requires a circular orbit, the speed of the vehicle will be constant and will depend on the altitude, as orbital velocity varies inversely with altitude.

We know from the laws of celestial mechanics that the greater the radius of the orbit along which a body travels, the lower its velocity will be. At the same distance from the earth as the moon (an average of 384,000 kilometres) a body in circular orbit would only need to travel at one kilometre a second. Thus the time taken for each orbit increases as the distance from the earth's centre increases.

At an altitude of 500 kilometres above the earth the orbit takes 90 minutes but an orbit equal to that of the distance of the moon would take roughly a month. If the velocity of a body moving in space exceeds the orbital velocity but does not reach the velocity of escape (which Russians engineers call the "second cosmic velocity," and which is approximately 11,200 metres a second at the earth's surface), it will move in an elliptical orbit.

Spaceship Vostok I, launched by the U.S.S.R. on April 12, 1961, had an elliptical orbit with its lowest altitude (perigee) at 181 kilometres and its greatest (apogee) at 327 kilometres from the earth. One orbit was made in 89.1 minutes. From these data the velocity of the spaceship is found to be 7,837 metres per second at the perigee and 7,688 metres per second at the apogee. In other words, engineers can now design rockets that travel at speeds seven or eight times greater than the muzzle velocity of a big gun.

Does the orbit of a space vehicle change as it encircles the earth a number of times? Many factors do, in fact, affect the variability of the flight paths, the chief among them being the shape of the earth. Our planet is not a true sphere but an oblate spheroid, the equatorial radius being 18 kilometres longer than the polar radius; its mass is not homogeneous since densities are unevenly distributed and gravitational pull, therefore, is not uniform.

The atmosphere still offers a noticable resistance to the motion of a body, even at altitudes of between 250 and

THREE, TWO, ONE, ZERO... The Soviet spaceship, Vostok I, leaves the launching pad in this shot which comes from the film, "The First Voyage Towards the Stars."

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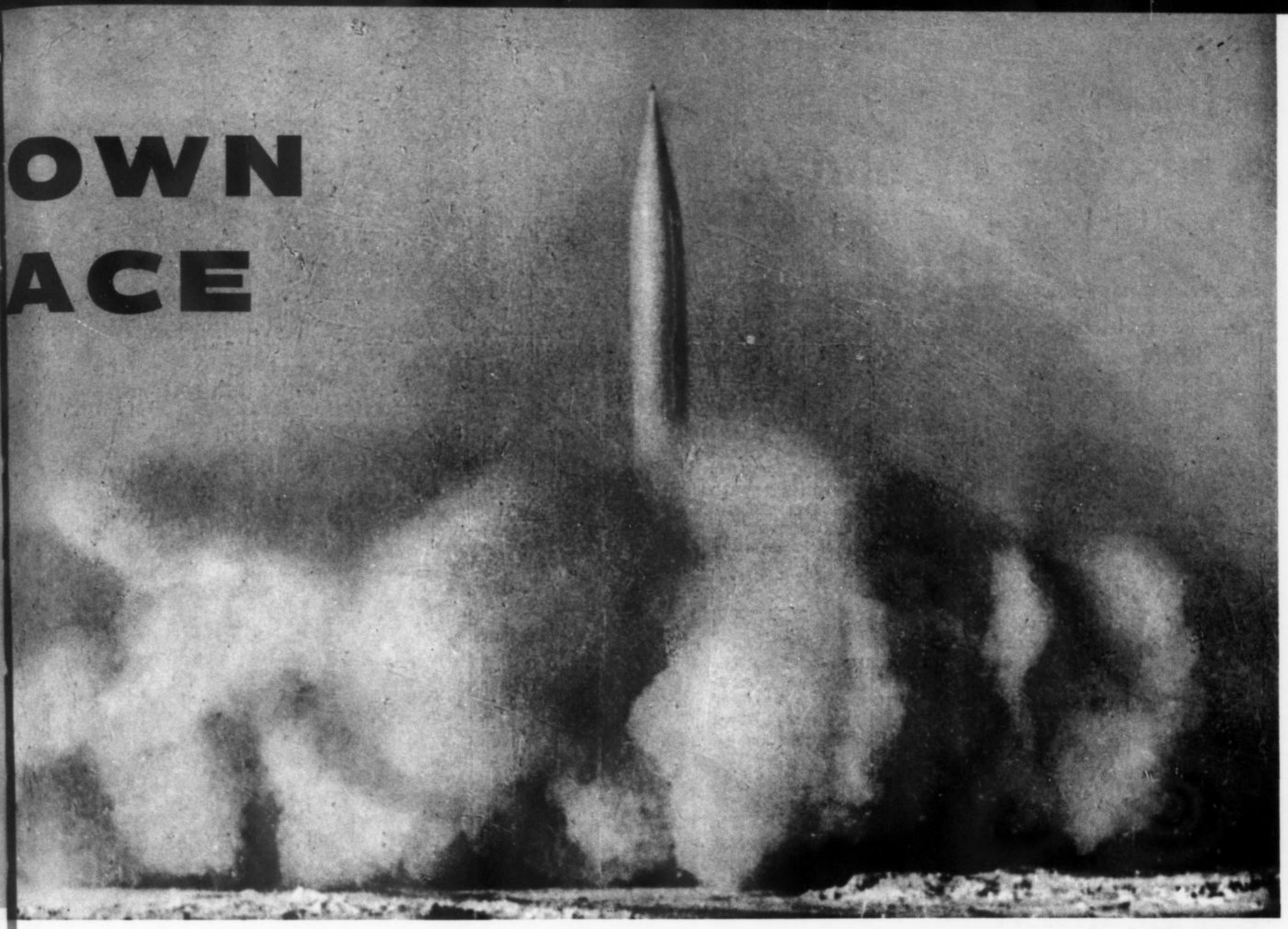


300 kilometres where the density of the atmosphere is no greater than that of the "vacuum" of a good radio valve. The continued effect of even such a rarefied atmosphere causes some changes in the dimensions of the orbit—the ship at such heights loses about two kilometres in altitude on each orbit so that after circling the earth 80 to 100 times it is brought back into denser layers of the atmosphere.

Probably the most important factor in the successful boosting of a space vehicle into orbit (and still more so for its landing in a pre-determined area) is the exact observance of the planned flight programme. Mathematical accuracy must be nothing less than prodigious. The slightest deviation of the vehicle in flight from the parameters in the programme would lead to errors that cannot be corrected in outer space—a rocket aimed at the moon, for instance, might shoot past it, or a spaceship re-entering the atmosphere at too high a velocity might burn up.

ALL automatic devices carried by the vehicle must function perfectly. The following example shows the degree of accuracy required. A satellite is to be boosted into an orbit elliptical in shape with a perigee at 6,640 kilometres and an apogee of 7,140 kilometres from the earth. If the velocity differs only by 10 metres per second due to the malfunctioning of the rocket motors—that is, by only twelve hundreths of one per cent of the velocity—there will be a difference of 39 kilometres in altitude at the apogee.

If, at the time the last stage burns out, the vehicle differs by one degree from the computed direction, the perigee will be 25 kilometres less and the apogee 25 kilometres greater than programmed; this would bring about vastly different flight conditions and might shift the orbit from a perfectly safe region into a radioactive zone or into the denser layers of the atmosphere.

The many artificial earth satellites that have been launched by the U.S.S.R. and the U.S.A. have enabled engineers to design high precision systems of piloting and delicate control devices that ensured the successful flights of the first spacemen. These pioneers of space flights are: Yuri Gagarin, Herman Titov, Adrian Nicolayev, Pavel Popovich, Valery Bykovsky and Valentina Tereshkova (the first space woman) in the U.S.S.R.; Alan Shepard, Virgil Grissom, John Glenn, Scott Carpenter, Walter Schirra and Gordon Cooper in the U.S.A.

When a spaceship returns to earth it has to be brought out of orbit and to do this means that its speed must be reduced. The methods evolved for this purpose are a combined application of the laws of celestial mechanics and the aerodynamics of a body moving at supersonic speeds. As the vehicle descends it enters the denser layers of the atmosphere that act as an "air brake". The orbital velocity is reduced by a system of braking rockets (retrorockets) whose action combines with the effective use of atmospheric resistance.

The retrorockets have a thrust opposing the direction in which the vehicle is moving; the moment they are switched on, therefore, the spaceship must be oriented so that the rocket nozzles point in the direction of flight. Re-entry at an altitude of eighty to a hundred kilometres and at a velocity many times greater than that of sound, subjects the vehicle to tremendous stresses.

There are two possible types of landing—hard and soft. The rocket ship sent from the U.S.S.R. to the moon in September 1959 made a "hard" landing—it made contact with the lunar surface at such a high velocity that it was destroyed by the impact. Even a hard landing involves many intricate calculations and must be made with steering, stabilizing and orienting devices of great reliability. A matter of a few metres deviation at the beginning of the vehicle's flight, or a slight variation in its speed could be fatal and the vessel would never reach the planet at which it was aimed.

The landings of spaceships with cosmonauts on board launched since 1961 are examples of "soft" landings. Most difficult of all is the soft landing of a space vehicle

CONT'D ON NEXT PAGE

A shower of meteorites

in a pre-determined area which depends on the retro-rockets being switched on at an exact moment with the vehicle in exactly the right position.

The distance travelled by the vehicle during descent is very great. Yuri Gagarin's spaceship continued in flight for half an hour after the "brakes" had been applied; the U.S. vehicle. Friendship-7, landed in the Atlantic Ocean after the "brakes" had been put on over the Western seaboard of America. The actual position of the vehicle and its exact velocity at the time the decelerating process is put into operation must be determined with absolute precision. An error of one metre per second in computing the velocity or of one kilometre in computing the altitude, would land the vehicle dozens of kilometres from the appointed spot.

IN the days before the first Sputniks were launched, the possibility of encountering meteorites was considered one of the greatest potential obstacles to space flight. As is well known, the earth (or rather its atmosphere) is under constant bombardment by a "cosmic shower", consisting of various-sized particles of matter coming from outer space.

American scientists have estimated that something like 30,000 meteorites with a diameter of one centimetre enter the atmosphere daily. The shower of meteorites of one millimetre in diameter is estimated at 75,000,000 a day while the smallest particles of all, those less than 0,005 mm., arrive daily in such quantities that it would require an eighteen-figure number to express them.

Thus it seems not only probable but absolutely inevitable for a spaceship to encounter meteorites on its journey. These generalized figures, however, do not present a true picture. Calculations have shown that a spaceship in flight might meet a meteorite with a diameter of half a millimetre once in fifteen years and one half a centimetre in size about once in 25.000 years. Although it is theoretically possible for a space vehicle to meet a dangerous meteorite, this probability is about as great as that of someone on earth being struck on the head by one.

Despite the unlikelihood of the danger, spaceships are nevertheless equipped with "shock absorbers" against meteorites.

Before a manned flight could be attempted, the intensity of cosmic, ultra-violet and corpuscular radiation had to be studied so as to estimate the degree of danger from them. Cosmic rays possess very great penetrative powers. If the walls of the pilot's capsule were thin, cosmic rays would penetrate and produce secondary radiation that would be harmful to the man inside.

THE nature of solar radiation in outer space is also different from that experienced on earth; a space flight is made outside the terrestrial atmosphere that forms man's natural protective screen from the sun by absorbing most of its ultra-violet rays. Studies of different kinds of radiation made by artificial earth satellites put into orbit by the U.S.S.R. and the U.S.A. have given engineers enough data to design space vehicles with structural features best calculated to protect them from harmful radiation effects.

It must be said, however, that the existing rockets are unfit as yet to protect the spacemen from radiation of high intensity and thus the proper choice of space routes is still of vital importance.

Rocket flights into outer space enabled the American scientist James A. Van Allen and the Soviet scientist S. N. Vernov to study areas close to the earth in which high-energy particles abound. These regions form several radiation belts in circumterrestrial space at various distances from the earth. Though deadly to man, these belts, are not, however, continuous, but contain "holes" over the earth's North and South Poles.

The particles in these radiation belts are of such high energy that effective protection from them would add tremendously to the weight of a space vehicle trying to penetrate them. It has not yet been found practicable to design such a ship and manned flights have been confined to orbits between the nearest radiation belt and the earth. Manned flights to other planets will have to follow a trajectory that leaves the earth close to one of the poles.

Another danger that existed has now been overcome by space vehicle designers. We know that our atmosphere is a reliable shield that protects us from meteorites—they burn up or disintegrate when they crash into the atmosphere at high velocities. A space vehicle could also become a "meteoric body" if its re-entry were made at too high a speed; the vehicle's mass is relatively small and the resistance of the atmosphere could easily destroy it.

The mechanism of atmospheric resistance is this: any body moving in the atmosphere pushes particles of air before it. This "push" is transmitted by molecules of air from particle to particle, thus providing a signal of the moving body's approach—a signal which travels uniformly at the speed of sound.

If the body is moving at a subsonic velocity, the signal spreads more rapidly than the body moves. Waves like those caused by throwing a stone in a pond spread through the atmosphere ahead of the moving body ; they consist of alternating condensed and rarefied layers of air.

These rapidly spreading waves provide the air particles with what might be described as a "warning signal" about the moving body so that they open up a path for it as it approaches and flow round it. The body moves forward, meeting little resistance. Though this description is somewhat simplified, it comes close to reality when the body concerned is streamlined.

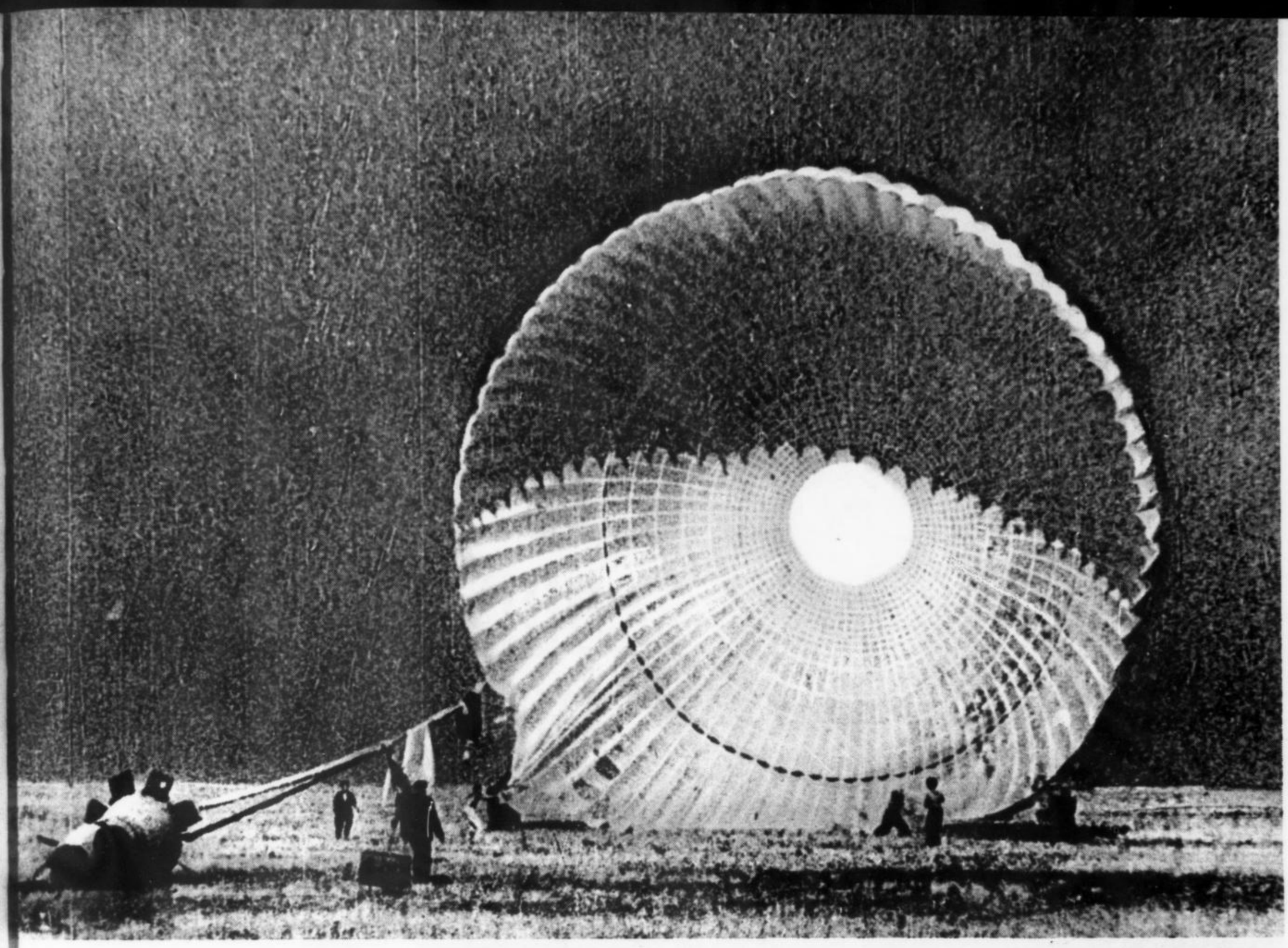
WHEN a body moves at supersonic velocities an entirely different situation is created. In this case the signal announcing its approach is delayed because the body moves faster than the waves can spread. A region of densely compressed air forms a cushion in front of the moving body. On a space vehicle's re-entry an impact wave forms ahead of it and the air cushion builds up between the wave and the vehicle.

The compression of the air brings about a tremendous increase in the pressure and temperature of the atmospheric gases. If the velocity of the vehicle is twice that of sound the temperature reaches 250° C., and if it is six times that of sound the temperature will rise to 1,800° C.

Describing his re-entry into the atmosphere, Herman Titov spoke of "a mass of fire of the brightest colours seething round the ship." The kinetic energy of the rapidly moving body is expended on the formation of the impact wave and on heating the air cushion—in other words, it loses velocity. The heat generated in the air cushion is only partly dispersed in the surrounding atmosphere, most of it is used to heat up the vehicle. A spaceship, therefore, must be provided with a protective shell and the velocity of its entry into the denser layers of the atmosphere must not exceed a certain limit.

Such is the overall picture, greatly simplified, of the flight of our present spaceships, the first vehicles to open up a path into outer space. Spaceships will not retain their present form, they will be improved and developed as science and technology progress. It may well be that spaceships will soon be as different from those we know today as modern motor cars differ from their prototypes of the late nineteenth century.

The authors of this article—EVGENY GREBENIKOV *and* VLADIMIR DYOMIN, *of the Patrice Lumumba University, Moscow, and* EVGENY AKSENOV *of the Sternberg Astronomical Institute, Moscow—are all specialists in physics and mathematics.*

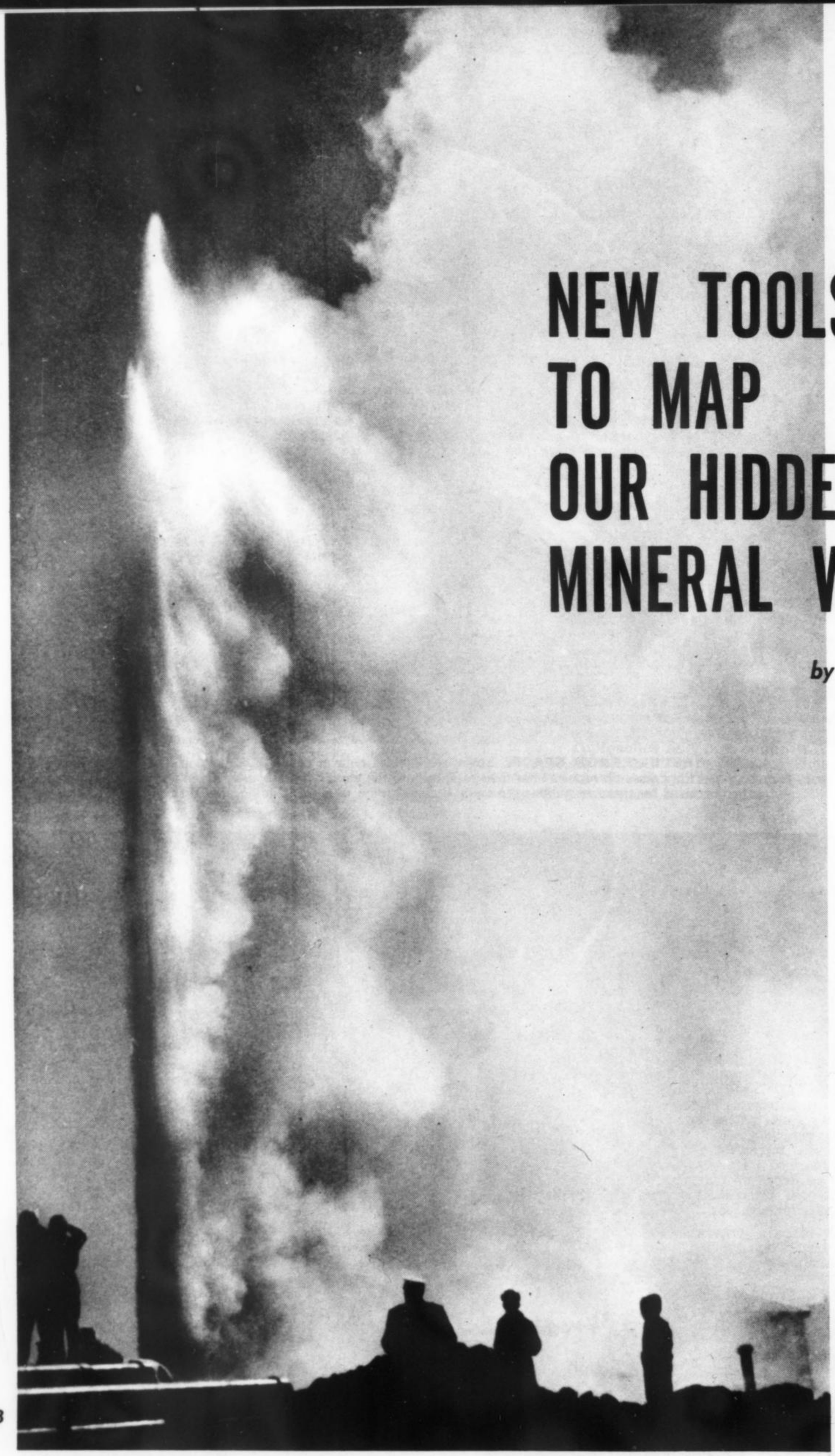


RETURN FROM SPACE. Soviet technicians recover capsules containing live animals parachuted from research rockets after their re-entry into the earth's atmosphere. Thanks to the giant parachutes used for these operations the animals come down to a soft landing after their flight into outer space.

APN photos

NEW TOOLS TO MAP OUR HIDDEN MINERAL WEALTH

by J. M. Bruckshaw



Petur Thomson-World Bank

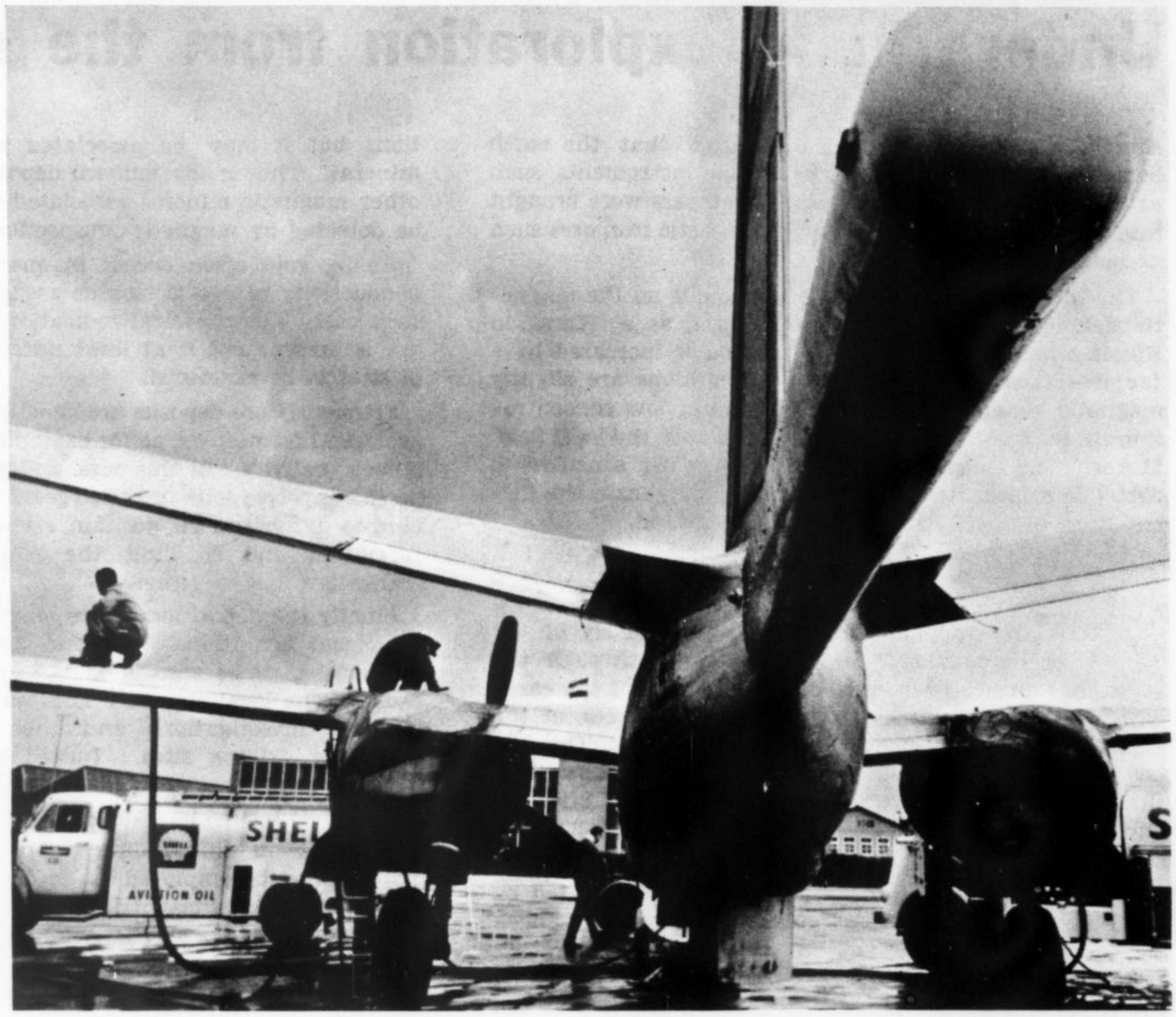
MAN-MADE GEYSER

A column of water boiling shoots skywards from a newly-drilled well in Reykjavik, capital city of Iceland. The water will be controlled and fed into the city's hot water system for commercial and domestic heating. From the Poles to the Tropics, geophysical and geological knowledge and techniques have been mobilized to aid the prospection for minerals and other valuable natural resources hidden underground. Their success in detecting underground water resources has led to many areas, particularly those in Africa, being opened up for development.

AIRBORNE SURVEYS

The increasing development of instruments enabling magnetic, electromagnetic and radioactive prospection to be carried out from the air has given vast new scope to the world-wide search for hidden mineral deposits. Airborne geophysical surveys have achieved outstanding success in the search for oil. The boom trailing behind the survey aircraft (right) contains a magnetometer which is used to locate and map the distribution of rocks with magnetic properties, such as strongly magnetic iron ores like magnetite, which is often associated with other mineral deposits.

Litton Industries, U.S.A.



THE search for minerals of importance to the community has always confronted man with major problems. The earlier discoveries, many of them accidental, were generally of ore bodies outcropping at the surface or those with a very thin superficial cover which could be penetrated at little cost by trenching or by shaft sinking. But once the shallower deposits had been located and exploited, it became far more costly and difficult to discover those at greater depths.

Thus it soon became evident that some guidance was necessary to reduce this cost. Initially this guidance was obtained from geological knowledge of the characteristics of the deposit and its environment and from theories of its genesis and mode of formation. This information and the detailed study of the surface geology, which could be extrapolated downwards, indicated the most likely sites for the discovery of ore deposits, thus resulting in increased discoveries and reduced costs.

Unfortunately with increasing depth the projection downwards of the surface geological picture became less reliable. This is especially the case in the presence of an unconformity—a break in the geological sequence—which can result in there being little or no relationship between the deeper rocks and those near the surface.

Following earlier sporadic investigations a real effort was made about 1920 to discover if some of the geophysical techniques, which had been found so successful in the study of the structure and properties of the earth as a whole could be used on a small scale to reveal similar information about local geology.

The very promising results obtained, particularly in the search for oil in the Texas-Louisiana Gulf Coast of the United States, encouraged further field exploration and the development of specialized instruments and led to yet another application of science that has been of economic benefit ever since.

The methods which were employed in the initial stages, and which continue in more sophisticated guise up to the present day, may be regarded as the classical techniques of geophysics: the study of the earth's gravitational field, of the earth's magnetic field and of earthquake waves. To these must be added those methods which employ the flow of direct or alternating current through the earth and—a more recent development—the study of the radioactive properties of rocks.

The first of these methods has led to a knowledge of the shape and size of the earth and also to modern ideas of the structure of continents and oceans. Its use in the prospection for minerals is based upon the fact that the presence of rocks denser than their surroundings leads to a locally high value of gravity. Thus the ability to measure in detail very small variations in gravity from place to place permits deductions concerning the distribution of densities in the upper few miles of the earth's crust. In the early days the gravity field was investigated by the Eötvös torsion balance, but this has now been superseded by modern gravity meters capable of detecting variations in gravity of two or three parts in 100,000,000.

The existence of local anomalies in the earth's magnetic field had long been realized and attributed to the distortion of the regular field by the presence of rocks of marked magnetic properties. Indeed, the magnetic method of prospection was the first to be exploited for economic ends;

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Underground exploration from the skies

shortly after it had been demonstrated that the earth behaved as an enormous magnet, crude instruments, such as the miner's dial and the miner's compass were brought into use in the search for strongly magnetic iron ores such as magnetite.

The influence of large magnetic deposits on the magnetic field may sometimes be spectacular, as at Kursk in Russia where the strength of the field is increased by a factor of about five. Many rock formations are slightly magnetic generally because they contain low concentrations of magnetite and they also can modify the local field. Modern field magnetometers are sufficiently sensitive to detect and measure these effects and to indicate the distribution of magnetic material underground.

THE study of earthquakes, particularly of the time of different shock waves through the earth, has given us a picture of the structure of the earth as a whole and, in the case of near earthquakes, of the structure of the continental and oceanic crusts. This has been possible because, as the shock waves are transmitted through the earth their paths are changed by reflection and refraction at boundaries between rocks through which the waves travel with different velocities.

In seismic prospecting, the earthquake is simulated by the detonation of a buried explosive charge. The shock waves travel through the various rocks, undergoing refraction and reflection as they cross boundaries separating rocks of different properties, and are detected at the surface by carefully placed instruments which, amongst other things measure the time of transit of the shock waves from explosion to detector. A suitable analysis of the data allows the position of the boundaries between the rocks to be located, revealing the general geological structure with its patterns of dipping beds, faults, anticlines, synclines, unconformities and other characteristic formations.

The electrical methods depend for their success upon the wide range of the electrical conductivities found in rocks and minerals. When a current is passed through the ground it distributes itself in such a way that the resistance to its flow is minimum, i.e. there is a concentration of current in rocks of high conductivity and a reduction of current in those of low conductivity. Thus an examination of the current distribution allows deductions concerning the variation of electrical conductivity in the ground.

The radioactive method was originally developed for the search for radioactive deposits, but the varying content of radioactive minerals in rocks enables us to differentiate between rock types under certain conditions.

The methods already described may be applied in a variety of ways to search for mineral deposits. Some minerals have exceptional physical properties which produce local distortions of the gravitational or magnetic field. Examples are the high density of minerals such as galena, chromite, barytes, etc., which modify locally the gravity field. The case of magnetite which has large magnetic properties has already been mentioned, while many base metal sulphides have excellent electrical conductivity, which distorts the flow of current through the ground.

More frequently the mineral sought may have no exceptional physical property which permits direct location, but it may be associated with another suitable mineral. Thus many mineral deposits have magnetite or other magnetic mineral associated with them which can be detected by magnetic prospection methods.

Again, gold often occurs in quartz reefs and the low conductivity of quartz may be used to trace the reefs. In such cases a geophysical indication is no guarantee that ore is present but it at least narrows down the number of sites to be examined.

Frequently ore deposits are genetically related to certain geological formations, as for example, those resulting from igneous activity. In this case, and depending on the properties involved, one or other geophysical method may be used to determine the position, size and inclination of the formation and so limit the potential zone of mineralization.

Finally the deposition of ore may be controlled by local geological conditions. Ore may be confined to certain formations, or be associated with rock contacts or with faults. The local structure is often revealed by the geophysical investigations and thus indicates the most promising drilling sites. Indeed the search for oil is reduced to a search for structures with which oil may be associated, such as an anticlinal trap, a fault trap, etc.

Naturally in this indirect approach more than one method may be employed as, in the search for oil where the magnetic, gravitational and seismic methods all play a part. Similarly the magnetic and electrical methods are frequently combined in the search for ore bodies.

Geophysical techniques were developed for use on land under a variety of conditions ranging from those of the Louisiana swamps to those in the Arctic. However, the extension of geological studies to the offshore continental shelves, and the vast mineral potential of these areas, encouraged the development of methods for use at sea.

Thus gravity measurements can now be made by means of underwater gravity meters lowered to the sea floor, and today, experiments with ship-borne gravity meters giving a continuous record of gravity along the ship's track are in progress.

In spite of the great difficulties caused by the motion of the ship, the sensitivities achieved already approach those necessary for prospecting.

IN marine seismic prospecting the situation is even better since the mobility of ships allows greater areas to be covered in a given time with a similar accuracy to that obtained on land. In fact on land the speed of operation may be severely restricted by rough topography and by vegetation and the inaccessibility of some areas.

Accordingly, instruments have been developed for magnetic, electromagnetic (one of the many electrical methods) and radioactive prospection from planes.

In addition to the greater speed with which an area can be surveyed by air, these methods have the further advantage that a continuous record of the variations in the field is obtained, whereas on the ground the measuring instruments are set up at a series of discrete stations between which estimated values have to be used.

Airborne geophysical surveys have been made extensively in all parts of the world and will continue for very many years. Their outstanding success has been achieved

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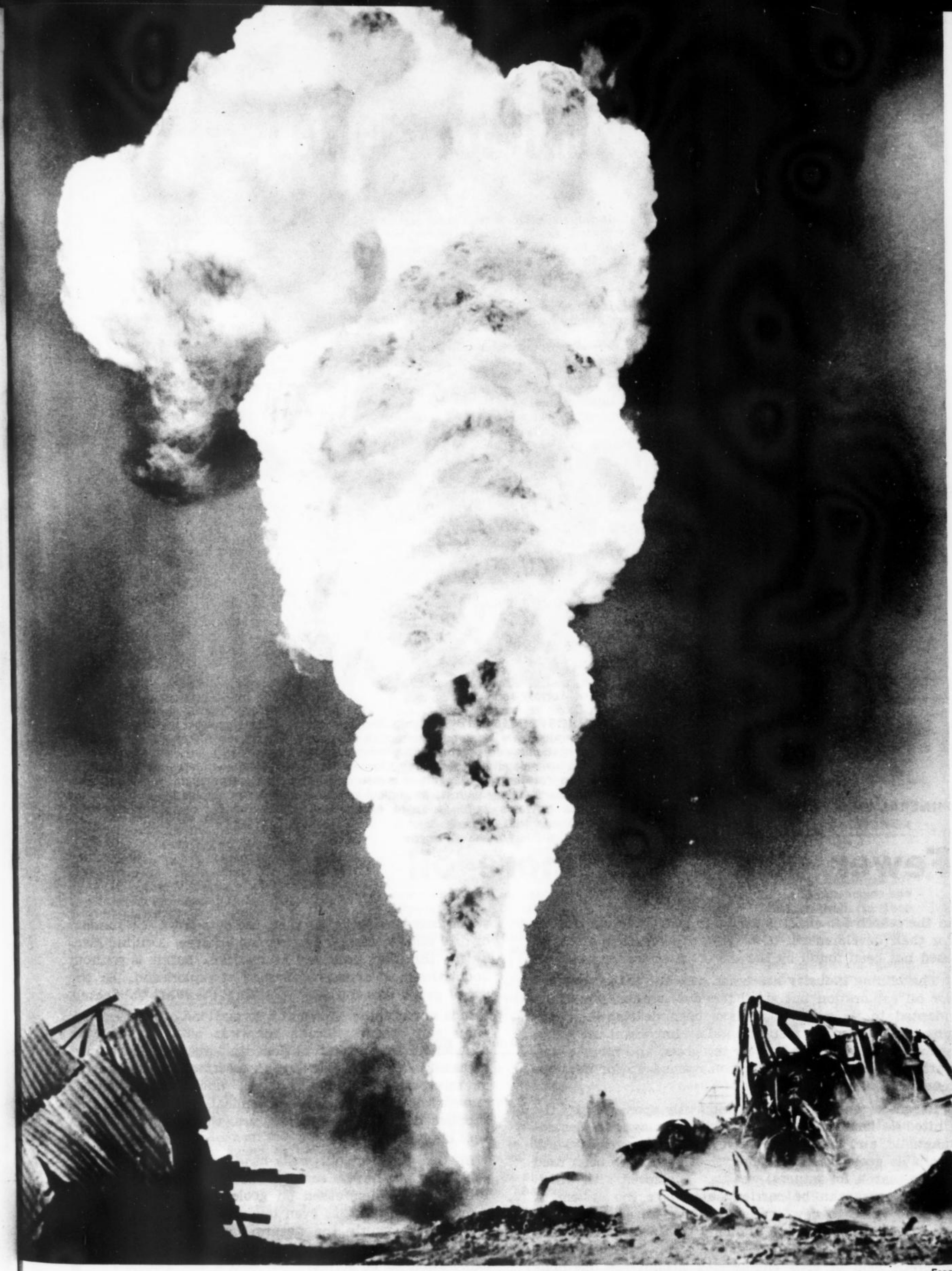
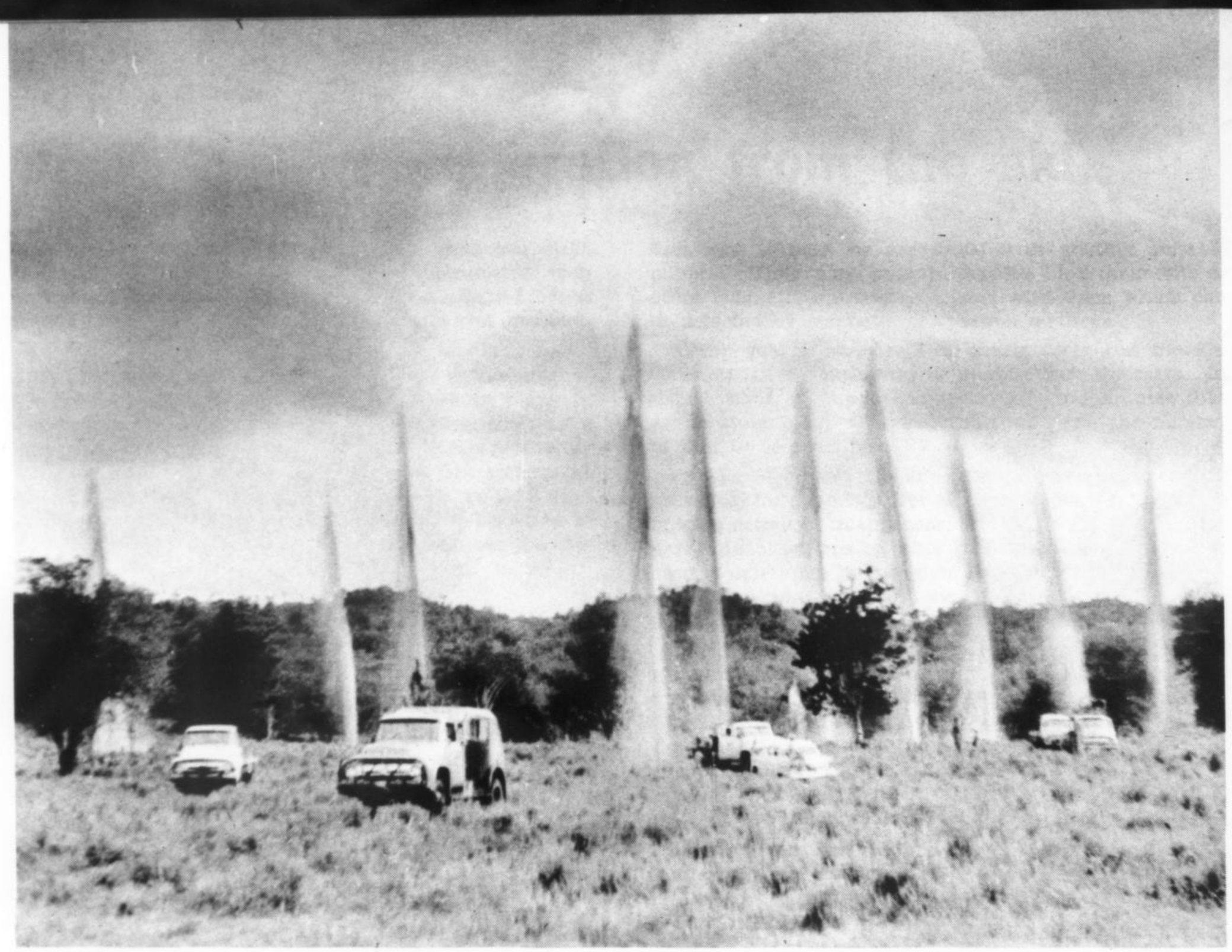


Esso

OIL GUSHER GOES WILD

A fiery column spouts from a blazing oil well in Venezuela. These spectacular oil fires may blaze for many months and are often only extinguished by costly and hazardous operations led by one or other of the handful of men in the world capable of mastering such flaming geysers of oil and gas. In the meantime, millions of gallons of oil have gone up in smoke and flame.



Litton Industries, U.S.A.

SEISMIC PROSPECTING. By studying the behaviour of shock waves set up by earthquakes as they are changed by reflection and refraction at boundaries between different layers of rocks, geophysicists have obtained a picture of the internal structure of the earth. In seismic prospecting the earthquake is simulated by a series of explosive charges and the time of transit of the resulting shock waves to detecting instruments is measured. From the data obtained, a record of the contour of the earth below with its geological structural patterns is obtained. Here, columns of earth spout upwards as a series of explosions are set off by seismic prospectors.

Fewer drill holes, more oil

in the search for oil, and the oil industry was responsible for their development. A very high percentage of all oil used has been found by the use of these techniques.

The mining industry has taken over the tools developed for oil exploration but since the war methods especially adapted to its own needs have been developed. Geophysical prospecting methods find an important use in the search for underground water resources, and many areas, particularly in Africa, have been opened up for development as a result.

Recent composite surveys (frequently sponsored by the United Nations) have included airborne, magnetic, electromagnetic, and radioactive surveys and photogeology. All available geological and geophysical data have been used in the search for mineral wealth. The speed with which these surveys can be carried out makes the system of extreme value to new countries where an essential part of establishing a sound economy is the discovery and exploitation of natural resources. In the completely different field of civil engineering geophysical methods have been used for site investigation of dam emplacements, bridge foundations and tunnels and naturally have added to the certainty of planning.

The main economic advantage of geophysical methods stems from the fact that their use cuts down the number of drill holes necessary to examine an area. Drilling gives by far the most positive information, but it is without doubt the most expensive method of exploration. By the use of geophysics the most promising areas are delineated.

It is unfortunate that many formations of no economic value can produce results identical with those of an economic area, and it is obvious that a suitable structure, revealed by the methods already described, may be barren of mineral. Some, but not all uncertainty may be removed by geological and geochemical considerations and, supplemented by these disciplines, the methods form a very potent tool.

In the case of oil, wells based upon non-technical considerations have a success rate of 1 in 30 compared to 1 in 5 or 6 when based on geological and geophysical investigations. But, as even today the quantity, the quality and frequently the nature itself of ore cannot be determined, there are still some important problems of exploration to be solved.

J. M. BRUCKSHAW *is head of the Geophysics Department and professor of Applied Geophysics at the Imperial College of Science and Technology, London.*

Letters to the Editor

MEDICAL SCHOOLS OF ANTIQUITY

Sir,

In your June 1963 issue, Sir Leonard Woolley mentions the internationalization of medicine in the ancient Middle East, as well as the free circulation of medical books from one country to another. But he does not mention where the medical schools were located.

D. Chowry Muthu in his book "The Antiquity of Hindu Medicine", 1931, writes that the *Rig Veda* (4000 to 2500 B.C.) gives the names of a thousand and one medical plants, as well as [details of] surgery, midwifery, therapeutics and sanitation.

Sir William Jones is quoted as having found an "entire Upanishad on the internal parts of the human body, with an enumeration of the nerves, veins and arteries," etc. The *Ayur Veda* was said to have been given from the god Indra to Atreya who then began a college of physicians, "whose work, the *Atraya Samhita* is the oldest existing work on medicine, containing 46,500 verses in all."

Susruta was the head of a school of surgeons in his "Ayur Vedic University in the city of Benares." using "101 varieties of blunt instruments and twenty different kinds of sharp (instruments)" that have only been slightly modified in modern times, also using anaesthetics, sterilization etc.

The University of Taxilla was famous for its medical school. And the "University of Nalanda had 100 lecture rooms, where 10,000 students received instruction; it had six immense blocks of residential buildings, each being four stories high..."

Arthur Johnson
Chicago, U.S.A.

SCORPION MAN OF SUMER

Sir,

The identification of the figure shown on page 7 of your June 1963 issue as a scorpion man is in my view an error. He is merely a priest or perhaps a dancer wearing a garment with a train. One of my reasons for saying this is that Sumerian art only produced anthropomorphic figures or combined human-animal figures in the lions at the Louvre Museum or in Nebuchadnezzar's *kudurru* in the British Museum, in which cases all the contrasting features are clearly indicated. It is clear that the artist responsible for the lyre or harp ornaments you reproduce had a good knowledge of animal anatomy as your illustrations show. Your "scorpion man" stands on human legs and this, to me, is a most telling detail. It is quite possible that the woven material of his Sumerian garment consists of a series of thick braids which to the writer of the caption suggested the likeness of a scorpion.

José Gonzalez Gracia
San Carlos de Bariloche, Argentina

Ed. note : Representations of combined human-animal figures are a characteristic feature of Sumerian art. Purely animalistic art in Sumer was in itself remarkable but animals—sometimes in a natural form and sometimes in fantastic guise—are also combined in a variety of decorative arrangements. One of the earliest known examples is the tress pattern used to form the body of a figure as in the case of the scorpion-man from the tomb of the King of Ur, described by Jurgis Baltrusaitis in his work, "Art Sumérien et Art Roman" published by Leroux, Paris.

INTERNATIONAL LANGUAGE CONCLAVE

Sir,

Professor Pei's article, "One Language for the World?", in the Nov. 1963 Courier was excellent, but I missed his usual urgency for immediate action. Now, with the United Nations' proposal for an International Co-operation Year, what better time for the universal acceptance of an international language which could be one of the major efforts during this special year? Perhaps we could emulate the Roman Catholic Church. Instead of the Cardinals, let's lock up representative linguists from every nation until they can agree upon an existing language, whether natural or artificial, that the world's peoples can start learning immediately in order to get better acquainted with one another while there is still time!

W. W. Ruby Rapsey
Willowdale, Ont., Canada

FIRMER THAN IT SEEMED

Sir,

Well done again, Courier! I mean the Oct. 1963 issue (Probing the Interior of the Earth). It was terrifically interesting to us in Japan, the most "shaky" country in the world.

I would like to make one record straight, though. The caption of the picture on page 27: "photograph of a swaying building only seconds before it collapsed" in the 1948 Fukui earthquake is grossly incorrect. Actually the building didn't collapse at all. It managed to survive the earthquake in the same state as shown in the picture, though badly scorched. It was later torn down for reconstruction.

You ask for my qualification of the statement? My father, Dr. Hideo Tamama was responsible for the reconstruction.

Tetuo Tamama
Sompachi, Ikeda
Osakafu, Japan

AID TO LANGUAGE TEACHING

Sir,

As an English teacher I would be very pleased to hear from you whether the articles of the French and English editions are alike, being in fact translations from one language into the other. I should like to use them in my top forms where learning how to translate properly is of main importance. I have a very modern classroom for language teaching so could any articles be made available on tape, in French, German and English?

Rev. J. P. Mooijman
Amsterdam, Netherlands

Ed. note : All our language editions are indeed alike, being translations from one language into another. They therefore can be used in language classes and are so used in schools of many countries throughout the world, but we do not have tapes of any of our language editions.

VISITING EDUCATORS IGNORED

Sir,

Sir Herbert Read, distinguished art critic, writer, poet, aesthetician and philosopher, visited Australia in June last year. He arrived in Sydney unheralded and departed in obscurity, and apart from a few small advertisements in the newspapers giving notice that two of his lectures would be open to the public, he received so little press publicity that only a comparatively few people were aware of his presence.

It is deplorable that public relations failed to grasp this previouly unequalled opportunity to culturally alert the Australian public and give them the opportunity of benefiting by the visit of so distinguished a man. I hope THE UNESCO COURIER, with its world coverage and its cultural dedication, will publish this letter and so alert administrators in other countries to herald the presence in their communities of visiting international educators, so as to give benefit to the broadest mass of inhabitants, rather than to the selected, established few.

Oscar Edwards
Sydney, Australia

From the Unesco Newsroom...

AUSTRALIAN SOLAR HOUSE. Scientists from the University of Queensland., Australia, have successfully experimented with a one-third normal size solar house which provides hot water, refrigeration and air-conditioning from its water-filled copper-tubing roof and cooking facilities from solar concentrators which focus rays of light and heat on to a container of oil. Further research will now be made with a family living inside a similar, but full-size house.

PROTECTING KENYA'S WILDLIFE: The Government of Kenya has pledged itself to conserve the country's natural resources. A declaration signed by the Prime Minister, Mr. Kenyatta, states: "The natural resources of this country—its wildlife which offers such an attraction to visitors from all over the world, the beautiful places in which these animals live, the mighty forests which guard the water catchment areas so vital to the survival of man and beast—are a priceless heritage for the future."

STAMPS GALORE: The world's largest philatelic collection composed of over 100,000 mint postage stamps issued during the past 90 years by some 500 countries, states and postal administrations is being presented on permanent loan by Britain's Post Office to the British Museum in London.

ALL STAR FESTIVAL: A unique phonograph record brought out by the Office of the U.N. High Commissioner for Refugees offering music and songs by 13 of the world's top recording stars is helping refugees in many parts of the world. Entitled "All Star Festival" this long-playing record is available through normal trade channels and all net proceeds are used to help U.N. refugee programmes including those run by the U.N. Relief and Works Agency for Palestine refugees. This 12" record is priced at $3.98 (mono) and $4.98 (stereo).

'ENGLISH BY TRAIN': Swedish commuters on the local morning train from Uppsala to Stockholm can now take English language lessons arranged by Uppsala University on two days a week. Riding in a special coach during their 40-mile journey, the commuter students converse in English and are taught useful phrases for business correspondence.

EUROPEAN SOCIAL SCIENCE CENTRE: Austria and UNESCO have signed an agreement regarding their respective contributions to the European Social Science Centre set up in Vienna by a decision of the UNESCO General Conference. The centre will carry out programmes of comparative research into social and economic structures in European countries. Themes to be dealt with include the social consequences and legal aspects of industrialization and the underdeveloped areas that exist in economically developed countries.

A SECOND 'BEAGLE' FOR THE GALAPAGOS: A research vessel fitted out in England for the Charles Darwin Research Foundation set out in November for the Galapagos Islands off the coast of Ecuador. It was here that the Charles Darwin Research Foundation was set up by UNESCO in 1959 (see THE UNESCO COURIER, Sept. 1961) to conserve and study the unique flora and fauna of the islands which started the train of Darwin's thought leading to the famous *Origin of Species*. The new research vessel has been named "Beagle" after the ship in which Darwin visited the Galapagos in 1835.

STONE AGE LIFE IN 1963: History students from Moscow and Leningrad universities have been finding out exactly what it was like to live under stone age conditions. Camping in the East Sayan Mountains of the Soviet Union, they used only stone implements, made fire by friction and hunted animals with crude weapons. They found it took three hours to light a fire by rubbing two sticks together and nine days to make a flint knife. But once they had made a flint axe, they felled a pine tree 40 cms thick in 30 minutes.

TOO FEW NURSES: "It's a fine job but there should be more of us." This was the view of all the nurses interviewed by "World Health," the monthly magazine of The World Health Organization, which devoted its December 1963 issue to Nursing in the World Today. Out of 2,500,000 qualified nurses in the world today, 750,000 work in the Americas, 780,000 in Europe and 600,000 in the Soviet Union. Thus there are only 400,000 for the immense populations of Africa, Asia and Oceania.

WORLD BOOM IN TV: One of the most spectacular developments in mass media during the past decade has been in TV. In 1953, North America had 90% of all operating transmitters. Europe, including the U.S.S.R., had only 7% and South America and Asia together had only 3%. By 1960, Europe had risen to 55%, and North America had dropped to 32%. Asia had 7% and South America 4%.

SWEDISH AID TO AFRICA: Sweden has offered nearly $500,000 to UNESCO to finance projects for extending educational opportunities for women and girls in Africa. Projects envisaged include a secondary school in Tanganyika, scholarships for 300 girls in Ghana, a teacher training college and a mobile cinema unit in Sierra Leone and mobile library services in Kenya, Tanganyika and Uganda.

ABU SIMBEL TO BE SAVED

PREPARATORY work will soon be under way on the immense operation of saving the Nubian temples of Abu Simbel from being engulfed by the waters of the Nile when the new Aswan Dam is completed. Through the efforts of Unesco and its member states the government of the United Arab Republic has been able to sign a contract with an international group of firms that will handle the operation of cutting up the temples and reconstructing them 210 feet above their present hillside site.

Unesco's campaign to save the Nubian monuments of the Nile Valley (see The Unesco Courier, Feb. 1960) has already made possible an extensive international programme of excavations, archaeological research and surveys and the dismantling and removal to safety of smaller temples and monuments. Various solutions to the outstanding problem of saving the Abu Simbel temples had been proposed, including a plan to slice them from the hill into which they were built 3,000 years ago, encase them in concrete boxes and raise these boxes over 200 feet by giant jacks (see The Unesco Courier, Oct. 1961). The project finally adopted—to cut up and then re-erect the temples—will cost an estimated $32 million plus a reserve of $4 million.

The United Arab Republic asked Unesco to obtain at least $20,500,000, and the outstanding difference between this figure and contributions announced by nearly 50 countries is expected to be covered by the campaign in the future. The U. A. R. has pledged itself to make good the gap between the sum called for by the international appeal and the total cost of the operation.

During the first six months of the operation a river port will be built 900 yards upstream from the temples, and roads and housing for workers constructed. Only then will the actual cutting of the temples into sections begin.

Flashes...

■ *Despite large-scale malaria eradication schemes, the World Health Organization estimates that close on 380 million people are still exposed to the risk of infection by this disease. WHO also estimates that 400 million people suffer from trachoma, which can cause blindness, and that over 10 million are victims of leprosy.*

■ *Gastronautics, the science of space feeding, is becoming a real problem as men are being launched into space for longer periods of time. An astronaut's menu now includes 23 different bite-size products and 37 different dehydrated products.*

■ *Unesco will set up a centre in Mexico for the planning and construction of school buildings to aid Latin American countries which are to spend $4,000 million in ten years in this field.*

■ *During the past eight years the number of the world's daily newspapers has declined, although total circulation has increased by 20%; in the same period radio receivers have increased by 60% and TV receivers by 200%.*

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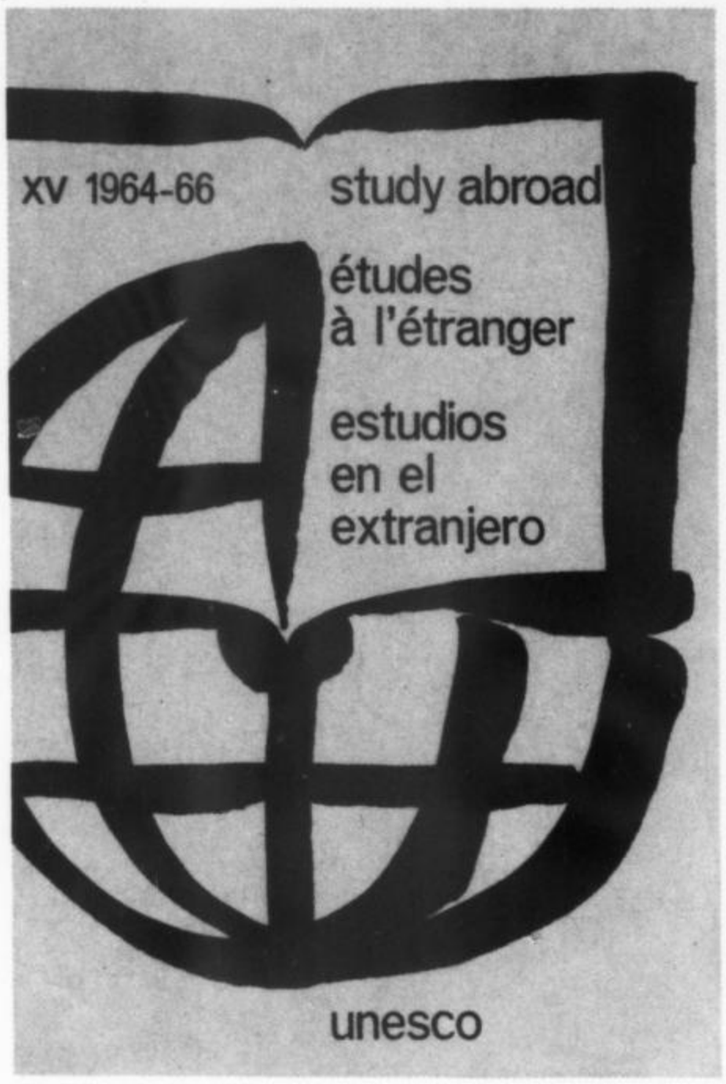

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TREASURES FROM THE DEPTHS

For many years only the upper layers of mineral wealth lying beneath the ground were exploited by man. Today, geophysical techniques are helping to reveal unsuspected mineral deposits in the depths of the earth. (See article, page 28.) They have proved a potent tool in the search for oil to enable refineries like the one shown here to satisfy growing world needs.